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Nationalization Proposals

Example of the Steel Industry

FACED with a situation roughly parallel with that confronting the electricity supply companies, the Iron and Steel Federation has agreed to participate in the Board which is to be set up for " the general control and supervision of the iron and steel industry."

A statement issued by the Ministry of Supply says that the Government has decided that the Board should concentrate, under the Minister, on the supervision of the development and reconstruction of the industry and on " the exercise of such continued direct control functions as may be necessary in such matters as production, distribution and prices. It will not be part of the functions of the Board or of the members from the steel industry to advise the Government in connection with plans for public ownership."

Declined Invitation

It will be recalled that the electricity supply companies' associations recently told the Minister of Fuel and Power that they could not accede to his request that they should appoint a " small committee of persons with an expert knowledge of the electricity supply industry whom the Minister could consult." Their reason for declining to agree to this course was that such consultations would be directed towards the framing of the Bill for nationalizing the industry.

It is at this point that the parallel with the iron and steel industry ceases to apply. The power companies said that they had at all times been ready and willing to co-operate and give the benefit of their wide experience in such work of organization and co-ordination of the industry as would be " in the national interest and in the future interests of the electricity industry and its employees " (using the Minister's own words). But they expressed their conviction that to nationalize the industry by transferring it to Government ownership was contrary to all these interests.

Obvious Decision

They were not given the option, as were the iron and steel companies, of serving on a body designed purely to bring about improvements, independently of the question of ownership. They were forced to choose between contributing to their own extinction or declining to have anything to do with the scheme. Their decision was such as might have been expected by the Minister (and probably was) and they were thus placed in an " unpatriotic " light.

This has just been accentuated by the " practically unanimous " decision of the I.M.E.A. to support the Government in its nationalization policy. It will not be generally appreciated by the public that the cases of the municipalities and the companies are very different (as we pointed out last week) and the companies are likely to suffer the odium of " intransigence."

What, then, should be their next move, seeing that the Government is clearly not to be deflected from its course ? While we must regret the inevitability of nationalization, because we have seen no evidence

that improvement will result, yet we should regret still more a disunity in the industry which might well impair its service to the nation. We hope it may yet be possible for all sections to come together in the broad interests of public service.

Street Lighting

THE announcement by the Minister of Transport that he is taking over the responsibility for street lighting comes appropriately just before the annual conference of the Association of Public Lighting Engineers. Members will thus be given another topic for discussion and their views will be of value. Mr. Barnes hopes that lighting authorities will adopt, as soon as they can, the recommendations of the Departmental Committee on Street Lighting (1937) of which Sir Clifford Paterson, Mr. J. F. Colquhoun and Dr. J. W. T. Walsh were members. While it is most important to raise the standard of illumination of main roads such improvement if carried out only in certain areas is likely to prove troublesome to road users, and the Minister is wise in stressing the need for uniformity, which of course should be at the higher level. The Minister made it clear that economy of fuel should be obtained by switching off at midnight rather than by reducing standards of lighting.

Loan Sanctions

STATISTICS just issued by the Electricity Commissioners show that during the past eight years they have sanctioned the borrowing by electricity supply undertakers of about £167 million, including £20 million by the Central Electricity Board. The bulk of the money was required for generating plant and the necessary buildings; it is noteworthy that applications in respect of wiring installations and apparatus rapidly declined during the war period, but an upward trend has now set in. During 1944-45 the total amount of sanctions rose above the pre-war figure and in 1945-46 was about a third higher at £37·7 million.

Commissioners' Statistics

ARISING out of the details of domestic consumption of electricity in Switzerland given in this issue, it is to be hoped that with the resumption of publication of the Electricity Commissioners' statistics, the opportunity can be taken to differentiate between the kWh used in (if not the revenue from) residences and in shops and other commercial premises. The omnibus heading of "lighting, heating and cooking" is inadequate for present-day developments, and the figures under it are usually, but incorrectly, identified with domestic consumption which amounts to less than two-thirds of the total in this category. The incomplete returns in Table 37 provide the only indication of cost per kWh as an overall figure.

Design for Industry

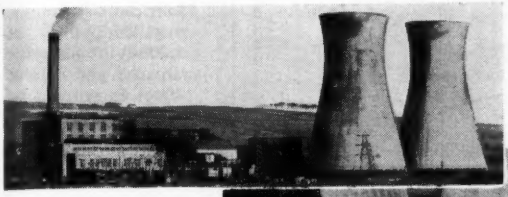
A GREAT deal is being thought and said nowadays on the subject of industrial design. Everybody seems to be agreed that mere utility in apparatus and equipment is not enough and the idea of William Morris and his disciples that even the commonplace may be made attractive is taking a firm hold. Practical expression of this idea is to be provided by the "Britain Can Make It" exhibition at the Victoria and Albert Museum opening on September 24th. In connection with this a number of conferences are being held; the first is being organized jointly by the Council of Industrial Design and the Federation of British Industries on September 26th and 27th. Among the speakers we notice the names of Mr. A. Whitaker, O.B.E., M.A., M.I.E.E., whose subject is "Design Training," and Mr. Leslie Gamage, M.C., who will stress the importance of good design in fostering export trade.

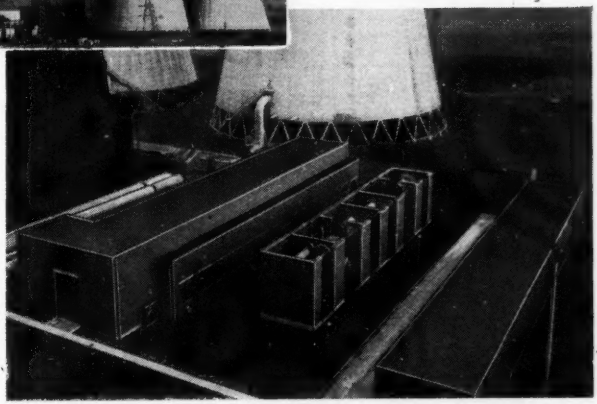
Fuel in the U.S.A.

IN many ways the fuel situation in the United States during the war years resembled our own. A report published by the World Power Conference refers to insufficiency of labour in mines and the lowering of boiler house and turbine-room efficiencies through the running of all kinds of plant for long hours. There were similar problems due to the widespread use of coal of high ash content. Although alternative fuels were not adopted to any great extent, the position must have been greatly eased through an increase in the output of hydro-electric stations from 44,000 million to 80,000 million kWh at the end of the period, when it probably reached about 60 per cent of the total. Price, there as here, had little effect on the choice of fuels, since availability was the determining factor. Now, however, the use of fuel in the United States is said to be on an economic basis.

33-kV Switch-House

Scheme at Blackburn in Connection with New Station





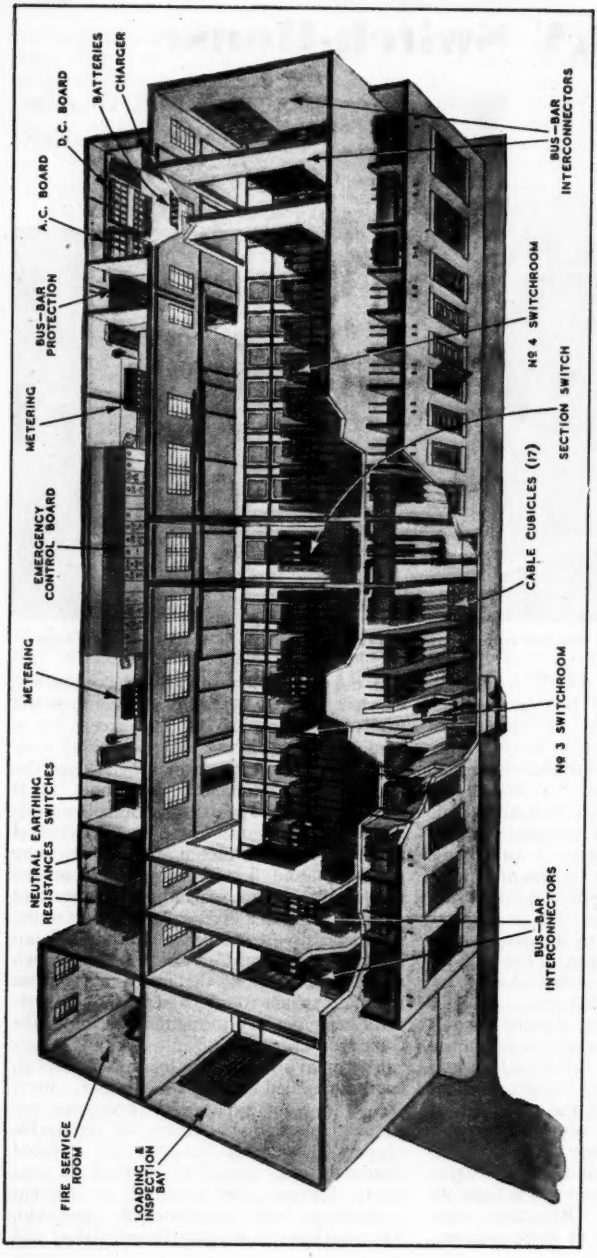
The new switch-house (left) runs parallel to the 6.6-kV switch-house right; interconnecting transformers between buildings

ASSOCIATED with the new power station of the Blackburn electricity undertaking, which was described in the *Electrical Review* of April 26th, is a new 33-kV switch-house which appears to us to represent probably the latest word in the expression of modern ideas regarding the segregation of equipment. It will be recalled that generation in the new station is at 33 kV direct, while generation at 6·6 kV is still continued in the old station. There are separate main transmission systems at both these voltages at Blackburn and, of course, links with the grid. Taking the broader viewpoint, then, of "electricity supply" at Blackburn, the importance of the new switch-house will be better appreciated by visualizing the part it plays in the essential link up, as an integral scheme of the grid, of both systems of generation and the primary transmission systems.

The principle of segregation is at first manifest by the isolation of the new switch-house from the power station, in line with an earlier development which embraced a 6·6-kV switch-house similarly isolated. Actually the new switch-house runs parallel to and about 75 ft from the 6·6-kV switch-house which is adjacent to the C.E.B. substation, and it lies, in common with the older switch-house, at right angles to the new turbine house on the south side, with a spacing of about 65 ft from the turbine house.

The building is a brick and concrete structure measuring overall about 164 ft long, 46 ft wide and 26 ft high. Regarded longitudinally the building is in three sections, with the main switch rooms in the centre bay which is about 24 ft wide and occupies the whole length of the building except for a loading and inspection bay about 20 ft wide at the north end. On the east side of the main switch rooms is a bay about 14 ft wide in which the 76-ft long control room is centrally disposed. Flanking the control room at the south end are busbar zone protection and battery rooms, and at the north end a neutral earthing resistance and switch room and a fire service room. On the west side of the main switch rooms is an annexe which comprises cable cubicles which afford separation of the main cables from the main switch rooms, a separate compartment being devoted to the termination of the cables for each circuit.

The main switchgear is of the metal-clad, compound-filled, duplicate busbar, horizontal-draw-out type, with provision for busbar selection by means of removable plugs. The circuit breakers are solenoid operated, and adequate interlocking and safety features are provided to prevent inadvertent and unauthorized operation. The switchgear is fitted with turbulators and



(From drawing supplied by Mr. Harral)

The new 33-kV switch-house probably represents the latest word on the segregation of switchgear, etc.

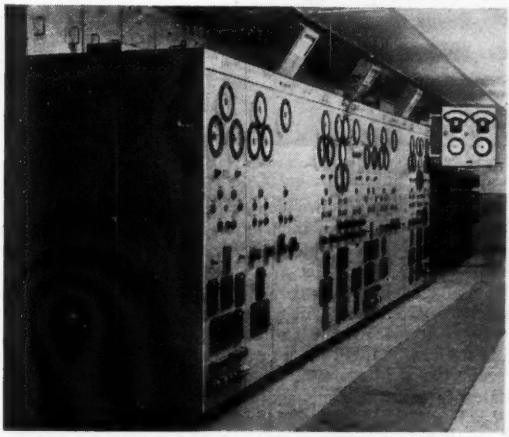
has a rupturing capacity of 1,000 MVA. There are at present fourteen switch units installed, five of 1,200-A carrying capacity and nine of 800-A carrying capacity. With the exception of one unit, namely, a 1,200-A busbar section switch, these are situated in the two switch rooms, seven in one room and six in the other. In one of the switch-house sections there are a 1,200-A unit controlling the l.v. side of a C.E.B. 30,000-kVA transformer; an 800-A, 40,000-kW turbo-alternator unit; an 800-A ring-main unit; an 800-A C.E.B. feeder unit; an 800-A interconnector unit; an 800-A skeleton unit for a future tie-reactor circuit; and a 1,200-A busbar coupler.

This equipment is duplicated in the other switch-house section, except that there are only six equipments in this case, there being no C.E.B. feeder unit, while the turbo-alternator switch in the second room controls, of course, the 30,000-kW turbo-alternator, i.e., the first of the two h.p. generating equipments installed in the new power station. The two interconnector switches provide the link with the 6·6-kV switchgear via two 20,000-kVA

outdoor transformers which are located between the two switch-houses and segregated on the cubicle principle, not only between themselves, but also between each transformer and its associated cooling equipment. The English Electric transformers are of the natural air cooled oil type, with remote electrically controlled on-load tap changing gear on the 33-kV side. The busbar section switch is arranged between the two switchrooms in a compartment of its own. The bottom (running) busbar is sectionalized by means of this switch, and the top (transfer) busbar is solid throughout the length of the switchboard. There is provision for the future installation of four additional switch units which will provide the necessary interconnection with a similar switch-house which will become necessary when the new power station is extended back on the site of the existing old station. It is intended that two of these future interconnectors, one for the top busbar and one for the bottom busbar, and each in its own separate compartment, shall be installed at each end of the main switchroom bay.

Between the two main switchrooms is the busbar section switch ; note rail track, truck, and fire-proof doors

There is a wide gangway in the switch-room bay, in front of the actual switchgear, and running from end to end of the building is a light rail track flush with the floor, with branches to each switch unit. By means of this and a special switch-lifting truck any unit can be withdrawn and run to the loading and inspection bay or to any other position for interchanging purposes. The railway runs right through the aligned doorways of the segregating walls, each of which is served by a sliding fire-proof door. An efficient oil draining system is provided by pebble-filled pits under each switch unit, with communicating ducts to an oil sump.



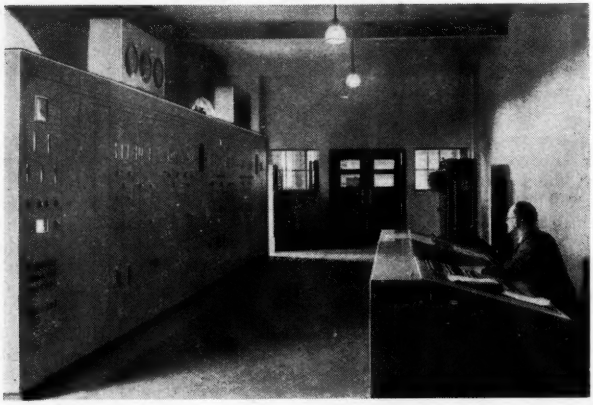
There is an emergency control board in the new switch-house

The switchgear is normally controlled from a main control board in the power station, but there is an emergency control board in the new switch-house. The main control board has the control and indicating devices associated with the operation of the alternator, transformer, feeder and other circuit breakers interposed

in a system diagram. Each feeder circuit breaker control switch is fitted with an indicating lamp which lights when the position of the control switch varies from that of the circuit breaker. The operating handle of the control switch is in the form of a semaphore indicator, and it can be turned either to the "open" or the "closed" position, so that circuit pre-selection is possible. The alternator circuit breaker control switches are similar to the feeder circuit breaker control switches. They operate interposing contactors which, in turn, complete the circuits to the motor-operating gear of the regulators and other apparatus.

The indicating instruments are of the moving-iron, flush-mounted, rectangular-dial type, with 6-in. vertical shadow scales. Each instrument is self-contained and can be withdrawn separately from its panel. An alarm panel is equipped with electro-magnetic superimposed dual-movement indicators for fire-alarm, Buchholz indication and protective relay operation, etc., and indication is given by non-coincidence between the two parts of an indicator which then form a cross. The board is surmounted by two swinging frames under hand-wheel control, each accommodating two 12-in. circular flush-mounted voltmeters and a 12-in. synchroscope. It has a matt finish, with the main panels in light green and the label panels and equipment in medium green. All the control switches and other operating controls are black. The busbar lines are black and red, and the neutral connections for the 6·6-kV transformers are brown. The emergency control board is generally similar to the main control board, except that it is of sheet-steel and that it has standard flush-mounted instruments and carries all the relays for the various circuits. It is finished in semi-glass lavender grey, and the instrument and relay cases are black.

The busbar zone protection relay board is a "Dualock" cubicle-type equipment, and the protection is arranged in one unit for the whole of the switchgear, including the three sections of busbars, but each busbar run is discriminatively protected, so that a fault in any one section isolates that section alone. The s.p. switchgear for controlling the alternator neutrals is of the single busbar metal-clad horizontal-draw-out type, with turbulator circuit breakers, and is generally similar to the main 33-kV switchgear. The earthing resistors are of the splayed-grid type, consisting of a number of alloy-steel banks which are mounted on micanite-insulated steel rods, with suitable spacing, etc., all housed in a mild-steel frame.



The main control board is in the power station

The neutral earthing resistor of the alternator is rated at 1,000 A for 30 seconds, and the interconnector transformer neutral resistors are rated at 1,750 A for 30 seconds. The 230-V, 750-Ah "Nife" station battery is operated automatically, a separate cabinet being provided for a selenium rectifier and the associated equipment for both normal and trickle charging. Distribution from the battery is effected by metal-clad unit-type interlocked switch-fuse gear, and contactors are provided for changing over automatically from the station a.c. supply to the battery supply in the event of mains failure. There is a similar distribution board in the battery room on the a.c. side.

The switchgear throughout is protected by a comprehensive "Mulsifyre" fire-fighting installation emanating from the fire service room, and an interesting feature of this installation is the absence of the usual service pump. Instead, the installation is fed from and is constantly under the head of a trough

of water around the interior wall of each of the "Davenport" cooling towers. This trough is normally filled with water as the result of condensation, but a pump is provided for emergency use.

"Pyrotenax" fire-proof cable is used throughout the installation for the controls and for all the battery, lighting and power supplies. All the major equipment throughout the switch-house is of Reyrolle production.

Mr. R. H. Harral, engineer and manager of the Blackburn electricity undertaking, acted as consulting engineer for the design, erection and equipment of the switch-house, and we are indebted to him for permission to view the installation and to publish this article. Our thanks are also due to Mr. A. N. Duffett, deputy engineer and manager, and to Mr. H. Parker, station superintendent, for their help in collecting the information and taking the photographs for this article.

Guidance for Contractors

Position Under W.B.A. Scheme

IN July, Mr. L. C. Penwill, Director of the Electrical Contractors' Association, outlined the position of the Association's members under the W.B.A. priority scheme for building materials. This is amplified in another letter which he has circulated containing notes based on rulings by the Ministry of Works.

It is stressed that the scheme relates only to materials and components required in building work. A schedule of the electrical goods within the scheme has already been sent to members. No concise definition of "building work" is available, but in general it covers work in connection with buildings (not in connection with industrial plant or machinery installed in buildings) and upon the water, light, heating and other services to buildings. Generally speaking, a broad interpretation will be given in considering applications for retrospective priorities as it is realized that in many cases it will be impossible to distinguish between "building" and "non-building" work. The necessary forms must not be used in respect of materials which are required for work which is clearly not "building work."

Non-Building Supplies

Local authorities are empowered to grant priority certificates only in connection with housing. Building priorities other than for housing are a matter for the Ministry of Works regional officers. With regard to materials for other than "building work," the Ministry of Works has stated:—"Attention is drawn to the fact that certain materials are used for purposes other than building and it is stated that the priority distribution scheme is intended to apply only to that part of total production which is normally used in building. . . . It is not designed to apply to or interfere with that proportion of the output of materials and components used for purposes other than building. Non-building industries should, therefore, continue to be able to obtain their requirements from their usual sources subject only to the exigencies of the general supply situation, and cases of difficulty arising from shortage of materials and components for purposes other than building should be taken up with the production authority for the material and component in question by the Department interested in the consumer of the material."

Wages and Output

Clause 1 of the wages agreement of April 6th last reads as follows:—"That in return for a fair wage paid by the employer it is incumbent upon the worker to give his maximum skill and service to the industry, this being the accepted obligation of the industry to the public which it serves. In consideration thereof the Electrical Trades Union undertakes to urge its members to respond to the urgent necessity of increasing output."

In this connection it has been decided by the N.J.I.C. that a statement signed by both the N.F.E.A. and the Electrical Trades Union, shall be prepared. Copies are being printed in two forms, viz., as a poster for display on notice boards and as a slip for insertion in wage packets. The statement is in the following terms:—"Attention is drawn to Clause (1) of the agreement between the Electrical Trades Union and the National Federated Electrical Association, dated the 6th April, 1946. It is the responsibility of the National Joint Industrial Council for the Electrical Contracting Industry to bring to the notice of all concerned that in return for a fair wage it is incumbent upon the worker to give his maximum skill and service to the industry, this being the accepted obligation of the industry to the public which it serves." It is signed by Mr. E. W. Bussey for the Electrical Trades Union and by Mr. L. C. Penwill for the National Federated Electrical Association.

Selfridges Electrical Exhibition

Selfridges, Ltd., inform us that the electrical exhibition to be held at their Oxford Street store, mentioned in our last issue, is now to open on October 2nd, not October 7th as originally arranged.

Views on the News

Reflections on Current Topics

AS I have mentioned on one or two previous occasions, amid the uncertainties which surround it the Incorporated Municipal Electrical Association was further embarrassed by the termination of the lease of its Wellington House offices. The task of finding a new home in the present state of accommodation in London was quite formidable but I am glad to learn that there has been a successful issue and from last Monday Mr. J. W. Simpson, the secretary, and his staff have been housed in temporary quarters in Earls Court Road, S.W.5.

Another electrical organization which has been forced to seek new premises is the Electrical Association for Women. Miss Caroline Haslett, the director, has also succeeded in her quest and will soon move her staff to offices in Grosvenor Place.

* * *

During the past week the newspapers have carried announcements by the Electricity Supply Companies' Public Relations Committee reminding the public that in the ten years before the war the companies more than halved the price of electricity to the domestic consumer. Advocates of nationalization have succeeded in convincing many people that these companies are hard-bitten monopolists who have been grinding the faces of the poor for many years so there was a need for a counterblast of this sort. The companies ask if any nationalized industry could do as much for the public and call for freedom to continue their service.

* * *

Last week from the summit of Ben Vorlich, the Minister of Fuel and Power told a Scottish audience:—" I am going to nationalize electricity in spite of all opposition. I do not say it arrogantly but it will be done." This was certainly going one better than proclaiming it from the housetops. Mr. Shinwell went on to say that although the Scottish scheme might be uneconomical in some parts, when it was associated with the national scheme it would prove solvent.

* * *

Regarding the differentiation made in the new B.S. 1320 (reported in last week's *Electrical Review*) between imported and home-grown timber for poles, the lowering of the factor of safety to 2·5 in the first case seems to me fully justified by half a century of reliable service. Equally consistant performance can hardly be expected from native wood used during the war, when sufficient attention could not always be paid to selection, time of year of felling, seasoning and creosoting. Nevertheless the better examples should be good for a life of twenty years or more. In view of the mixed nature of the whole, the wisdom of the decision to retain a factor of safety of 3·5 for British poles (equal to that for the much more costly reinforced-concrete) can hardly be questioned until more extended experience warrants reconsideration of their claims.

* * *

What may be regarded as a triumph of " trade unionism " is reported from Bury, although I prefer to regard it as a triumph of common sense over parochial prejudice. The Corporation has decided to offer the full scale salary for the post of electrical engineer which has been vacant since the retirement of Mr. J. G. Potts. When the post was first advertised at a salary £200 or so below the scale figure there was a very poor response as the A.M.E.E.-E.P.E.A. Joint Committee banned the job. In spite of this the Council re-advertised on the same terms with an equally disappointing result. The trouble seemed to be not so much reluctance to pay " the rate for the job " as resentment at " dictation " by outside bodies. I hope that Bury will now secure more satisfactory results.

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" Squatters " are very much in the news to-day. It is interesting to see that a number of electricity supply authorities are winking at the illegal seizure of Government premises by providing supplies to some of these camps, a startling departure by an industry which has a record of a sometimes too-strict conformity with the law. I hope that due regard is being paid to the nature of the electrical installations in the buildings which have been taken over. Some of those which I have seen have been very " temporary " and unless care is exercised there may be trouble.

* * *

Some time ago I referred to the sale by Finchley Electricity Department of goldfish which have been bred in the artificial pond at the electricity works to reduce the mosquito nuisance. From reports reaching me it seems that the Finchley " fishing industry " is still going strong and the total sales are now more than £375. It is not anticipated, however, that sales will reach such dimensions that the profits therefrom will justify passing on the benefit to consumers in the form of reduced charges. There is accordingly no prospect of electricity supply becoming a mere sideline.—**REFLECTOR.**

Diesel-Electric Ship

Equipment of a Former German Vessel

By F. E. Little

THE electrical installation of the captured German Diesel-electric ship, *Empire Welland* (formerly the *Patria*), in which I recently became chief electrician, embodies many interesting features. Power is obtained from six three-phase, 50-cycle, 250-r.p.m., 3·3-kV alternators, five of which, rated at 2,160 kW, are direct-coupled to eight-cylinder Diesel engines and one of 1,600 kW to a six-cylinder Diesel. These are installed in two engine rooms amidships, separated by a water-tight bulkhead with an electro-hydraulically operated door between them.

In the forward engine room are the controls of the starboard propulsion motor and, in an isolated compartment, the high-voltage switchgear and reactors for paralleling the alternators, a 700-kVA, 3·3-kV/400-V transformer, a 100-kVA, 3·3-kV/380-V automatic voltage-regulating transformer and a motor-driven exciter, which supplies the field of the starboard propulsion motor as well as of the three alternators. The contents of the aft engine room, which is associated with the port propulsion motor, are similar, except that the regulating transformer is of 600-kVA capacity and there are two exciters, one being standby. Either of the exciters can supply d.c. to the cargo winches and cranes.

The two 5,680-kW, 3·3kV synchronous motors for propulsion are located in the stern. Motors and shafting run on roller and ball races and the stern tubes are of the " Cedarval " type. All machines and switch rooms are cooled on the closed-air system, each machine having its own fan motor and built-in cooler. Temperatures at various points are shown on a pyrometer with a multi-way selector switch which is mounted on the switchboard.

For providing supplies in emergency, two 130-kW, 380-V Diesel-alternators are housed with the main lower-voltage switchboard on the deck above the forward engine room. Each of their direct-coupled exciters can provide half the fields for the main alternators supplying the power network. These sets are automatically started from 48-V batteries, one by means of two electric motors geared to the flywheel; power failure or fire-alarm operation causes the set to run up, in the former case relays closing its circuit-breaker on to the " lighting only " busbars and also starting a cooling-water pump. The second unit is started through a solenoid opening a valve from the compressed-air system, but is not switched in until after the operator has cleared any excessive load.

The 380-V switchboard is split up into four busbar sections (Fig. 1) which can be linked together through two-way switches; the section controlling the emergency alternators is also coupled to the one adjacent by an automatic coupler, which is interconnected with the breaker of the first emergency alternator so that when one is in the other is out.

All the main alternators can be used for propulsion, but the " No. 3 " sets, namely, the 1,600-kW machine in the forward engine room and one of the 2,160-kW machines in the aft room, or both in parallel, can also supply the ship's network. Machine breakers on the other alternators and the synchronous motors are compressed-air operated, either locally or remotely by means of solenoids. Air pressure is about 150 lb per sq in.

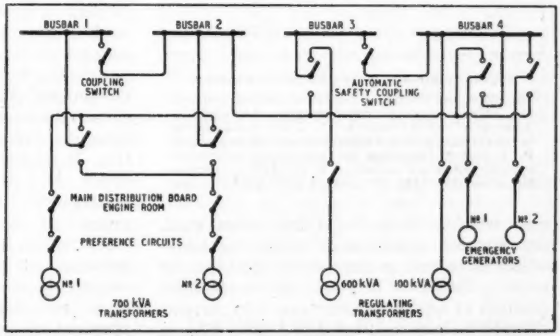


Fig. 1.—Connections to ship's network switchboard

Control of the main motors is from desks in the engine rooms, which are each fitted with duplicate instruments to enable conditions in one engine room to be observed in the other. The controller barrel is in three steps and is moved clockwise for ahead running and counter-clockwise for astern. It is interconnected with the electric telegraph from the bridge and incorrect compliance with an order puts a feed into the out-of-balance relay of the motor, opening the d.c. excitation breaker and thus necessitating the return of the control to the " stop " position.

On starting, the main alternators are run up to an idling speed of 100 r.p.m. and the appropriate high-voltage and excitation switches are closed. The control barrel is rotated until the pointer is at the first step in the desired direction, which at the same time operates cams that close the direction contactors of the motor and the contactors for over-exciting the alternators. The motor

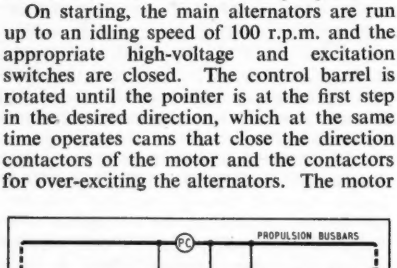


Fig. 2.—Main alternator paralleling system

PC.—Port and starboard propulsion busbar coupler. NC.—Ship's network busbar coupler. L1 and L2.—Alternator circuit-breakers. A, C and S.—Switches for connecting port and starboard propulsion busbars. B, C and S.—Switches for connecting propulsion system and ship's network. E, D and S.—Switches for connecting "No. 3 " forward and aft alternators.

now revolves as an induction motor until, on reaching synchronous speed, the hand-wheel is turned to the second position for exciting the motor field and then to the third position at which the alternator field currents drop to their normal value of 210 A. Engine governors are regulated by motor-operated speed devices, either by push-buttons individually or simultaneously from a dual-control.

To stop the motor the hand-wheel is rotated in the opposite direction until the " de-excitation " position is reached, at which the hand-wheel is left until the field has discharged itself through resistances. On moving it to the " off " position a contactor closes and puts approximately 50 per cent of the excitation current on to the motor field, which acts as a brake to the motor. If, however, it is to remain at the stop position for any appreciable time the braking contactor may be opened by means of a rotary switch at the main control wheel. In the original design the full motor field was left on; the resistances were installed later, presumably in order to lessen the shock to the motors and shafting on braking.

When the pilot has disembarked and the voyage has started, all the alternators and motors may be paralleled together with the ship's network. This enables the machines to be run at maximum load and efficiency at all speeds because at low speeds machines may be switched out and shut down. The busbar coupling and paralleling switches are foolproof, because should the operator in an emergency manœuvre forget to open them by means of the push-buttons, the moving of the main control hand-wheel from the third position automatically opens them.

Paralleling Methods

Alternators are paralleled from a central control point in the forward engine room. The push-buttons operating the compressed-air switches and coupling ammeters and two " reed "-type frequency meters are all on one panel. A selector switch has four ways for paralleling port and starboard power networks, propulsion system and networks, network alternators and " off." When this switch is in the required position, the couplers PC and NC (Fig. 2) are closed, bringing into circuit the two reactors, and when the two networks are synchronized a switch " S " (Fig. 2) is closed to couple the two busbars. When the circulating currents through the reactors have died down to zero, the compressed-air switch is closed, and the switch " S " and switches may be opened. If the operator fails to open the last two switches, moving the selector switch to the off position does so. All circuit breakers are blast-operated through push-button control of magnetically-operated valves. Earth protection of the main alternators, switchgear and propulsion motors is on the Merz-Price system.

On starting from dead ship, the emergency machines are run up to the normal speed.

No. 1 will automatically switch itself on to No. 4 busbars supplying the lighting for all the ship. No. 2 machine may now be switched on and the busbar linking switches closed, so as to supply power to the preference circuits in the engine rooms. The exciter set in the selected engine room is then started by means of a star-delta oil switch which is left temporarily in the " star " position to obviate damage to the machine should a fault occur during the first stages of starting.

All high-voltage switches may now be closed for the machine selected and the transformers and the distribution switches for the pumps. The selected network machine No. 3 is now run up to full speed and, after closing the excitation switch, the main compressed-air-operated switch is closed, feeding the high-voltage busbars. A 700-kVA transformer may now be switched in but, as it cannot be paralleled with No. 2 emergency machine, the latter must first be switched out by means of a remote-control switch, which is fitted with a pilot light adjacent to the transformer lower-voltage switch. The exciter oil switch is then moved to " delta " and either of the voltage-regulating transformers is switched in, the closing of its lower-voltage switch automatically opening the circuit-breaker of No. 1 emergency machine.

Auxiliary machinery, except that used for cargo handling, is driven by three-phase 50-cycle 300-V direct-on-line-started induction motors. Winches and cranes are driven by d.c. 250-V motors supplied from the exciters and using an earth-return system. The cranes are fitted with three motors, one for lifting and lowering the jib, one for slewing and the other for the cargo runner. Boat winches are driven by three-phase motors.

Lighting is at 220 V with earth return. All three phases have been taken into the distribution boxes where the load is balanced evenly. " Stutz " circuit-breakers are used exclusively on these circuits. For portable and cargo lighting 220 V is stepped down to a 40-V earth-return system.

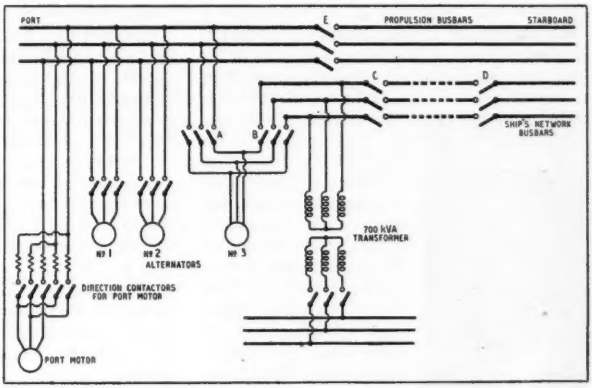


Fig. 3.—Propulsion supply connections (port side)

A.—Selector switch for propulsion. B.—Selector switch for ship's network. C and D.—Isolating switches in forward and aft engine rooms. E.—Propulsion busbar coupler.

The rudder is electro-hydraulically operated having two motors driving two " Hele-Shaw " type pumps. The wheel is mechanically coupled to a potentiometer, a duplicate of which is installed in the rudder machine room. Deviation of the wheel from the centre position unbalances a Wheatstone bridge which starts a servo-motor, which is permitted to run until the rudder potentiometer assumes the position of its counterpart. The d.c. supply for the separately excited field of the servo-motor is obtained from metal rectifiers, many of which are used in the ship, mostly in contactor coil circuits.

My observations have satisfied me that this vessel represents a step in the right direction in shipping and confirms my experience that for flexibility electric propulsion cannot be surpassed. Its efficiency is high, and both running and maintenance costs are low.

Training Course for Cable Jointers

LUTON Corporation electricity undertaking is holding its second training course for cable jointers, the first having been held during last winter. The course consists of six weeks' full-time instruction and practice in l.v. cable jointing. In addition to trainees from the Luton undertaking, five trainees from three neighbouring undertakings are attending the present course.

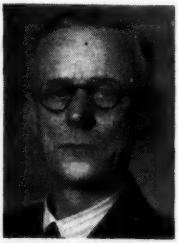
I.E.E. Section Chairmen

Biographies of New Officers

THE new chairman of the Installations Section of the Institution of Electrical Engineers is **Mr. J. F. Shipley,** partner in the firm of Mackness & Shipley, consulting engineers. Mr. Shipley received his technical training at Finsbury Technical College, and from 1903 to 1914 was a member of the staff of the Power and Mining Department of the Electrical Company, Ltd., London, after which he joined Graham Rowe & Co., of Liverpool and New York, as chief engineer, and advised them on technical problems connected with mining, agriculture and industrial projects in Chile, Peru and Bolivia, in which work the supply of power played an important part.

Mr. J. F. Shipley

On his return to this country in 1924, Mr. Shipley joined the late Mr. C. F. Mackness, first as his assistant and later as his partner, when the firm of Mackness & Shipley was founded. The firm has been retained for advice, investigation and procedure by public supply companies at home and abroad, and has advised electrical manufacturers, civil engineers, naval architects, engine builders, mining companies, and other industrial concerns on problems of a technical nature. From 1934 to 1940, Mr. Shipley was a director of Central European Mines, Ltd., an English company operating the Mezica lead mine near Klagenfurt, which possessed several small hydro-electric stations. He has made a detailed study of the design, manufacture and use of banded pipes for very high pressures.



Mr. L. J. Matthews

Mr. L. J. Matthews, who has been elected chairman of the Measurements Section for the 1946-47 Session, received his training under Prof. Silvanus Thompson at Finsbury Technical College. He joined the Electrical Apparatus Co., Ltd., in 1909 as test engineer, and three years later went to the Board of Trade in the Standards Laboratory. He returned to the Electrical Apparatus Co., however, in 1914 where he became chief of the Meter Test Department, chief engineer of the Meter Department and sales engineer. He is now a director of the company and sales manager of the Meter, Instrument and Export Department. He is a member of technical committees of the B.S.I., E.R.A., and B.E.A.M.A.

The new chairman of the Radio Section, **Professor Willis Jackson,** D.Sc., D.Phil., was recently appointed to the University Chair of Electrical Engineering, tenable at the Imperial College of Science, a position which he is taking up on October 1st next. He was educated at Manchester and Oxford Universities, and was a college apprentice with the Metropolitan-Vickers Electrical Co., Ltd. After holding appointments as lecturer in electrical engineering at Bradford Technical College and the Manchester College of Technology he joined the Metropolitan-Vickers Co. in 1936 as research engineer. Two years later he became Professor of Electrotechnics, Manchester University. Professor Willis Jackson is a member of the Radio Research Board. He is on the Executive Committee of the N.P.L., and of the Central Advisory Council for England of the Ministry of Education.

Prof. Willis Jackson

The chairman of the Transmission Section is **Mr. J. A. Lee,** who is construction engineer at the headquarters of the Central Electricity Board in London.

I.E.E. Benevolent Fund

THE annual dinner dance of the Mersey and North Wales Centre of the I.E.E., held on March 8th was attended by 300 members and friends, while the annual golf competition held on May 23rd attracted 75 competitors. As a result of these functions the Committee has been able to hand over to the Institution Benevolent Fund the sum of £250.

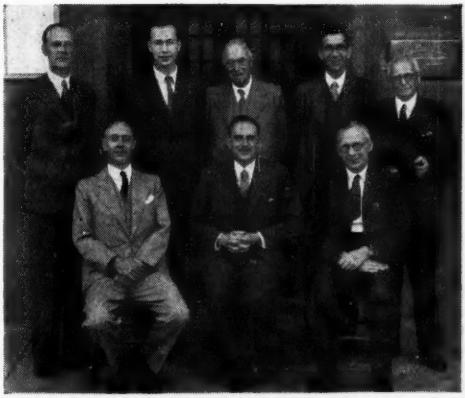
PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Central Electricity Board has appointed **Mr. P. Gordon Hieatt,** A.M.I.E.E., to be operation engineer for the Mid-East England and North-East England grid scheme areas. Before joining the Board's staff in July, 1931, Mr. Hieatt served in the Electricity Departments of the Hackney, Croydon, Derby, Rotherham and York Corporations and with the Northmet Power Co. In recent years he has been senior assistant operation engineer for Mid-East England.

Bolton (Lancs) Corporation Electricity Committee is to advertise for a borough electrical engineer in succession to **Mr. H. E. Annett,** M.I.E.E., who is due to retire next January. Subject to approval by the Establishment Committee the position will be advertised at a basic salary of £1,600. **Mr. T. Jack,** A.M.I.E.E., deputy electrical engineer, who was to have retired at the end of this month, has been re-engaged for a further three months.

The following staff appointments have recently been made by the Westinghouse Brake & Signal Co., Ltd.:—**Mr. M. W. Shorter** has been appointed deputy general sales manager, **Mr. C. F. D. Venning,** commercial manager (Signal and Colliery Department), and **Messrs. F. G. Hathaway** and **F. T. Tresize,** sales engineers (Signal and Colliery Department) at the London office. **Mr. P. Cruse** has been appointed deputy general works manager at the Chippenham factory.



Members of the A.E.I. Research Committee during a recent visit to Lydbrook

Sir William Griffiths, D.Sc., F.R.I.C., F.I.P. (Mond Nickel Co., Ltd.), **Mr. H. J. Allcock.** M.Sc., M.I.Mech.E., M.I.E.E. (British Insulated Callender's Cables, Ltd.) and **Mr. C. F. S. Taylor,** M.C. (Rhokana Corporation, Ltd.), have been appointed to the Management Committee of the Copper Development Association.

Mr. E. A. Logan, M.Sc., who as reported last week is shortly taking up the position of engineer and manager in the Electricity Supply Division of the Government of Burma, was born at Newcastle-upon-Tyne in 1901 and received his education at Rutherford and Armstrong Colleges. After two years in the Civil Section of the Admiralty at H.M. Signal School, Portsmouth, he joined Merz & McLellan as assistant engineer in 1923, remaining with them until 1929 when he was appointed chief assistant mains superintendent with the Yorkshire Electric Power Co. He became resident engineer with the Mid-Cumberland Electricity Co., Ltd., in 1932 (being first engineer to the new company) and left in 1936 to join the Erith Electricity Department of which he is engineer and manager. While at Erith he has been responsible for intensive domestic development and at the outbreak of the war one house in every three had an electric cooker. Mr. Logan is a member of the Institutions of Civil and Electrical Engineers. He was awarded an I.E.E. Students' Premium in 1929 for a paper on "Economic Electric Transmission."

Mr. E. A. Logan

Members of the Research Committee of Associated Electrical Industries, Ltd., recently met at Lydbrook when the accompanying photograph was taken. This shows (standing, left to right): Mr. V. L. H. Plascott (general works manager, Edison Swan Cables), Mr. J. T. Kendall, Mr. E. P. Grimsdick (managing director, A.E.I., Ltd.), Dr. J. M. Dodds (M.V. Research Laboratories) and Mr. T. Wadsworth (B.T.H. Laboratories) Seated: Mr. B. G. Churcher, Mr. J. S. A. Bunting (managing director, Edison Swan Cables) and Mr. J. L. Davies.

Mr. R. G. Parrott, who is with the Metropolitan-Vickers Electrical Export Co., Ltd., in Buenos Aires, and is hon. secretary of the Argentine Branch of the I.E.E., informs us that he has changed his address, which now is Avenida Pte. R. Sãenz Peña 636, Buenos Aires.

C†

The N.E.S.C.O.E. Association is to hold a special dinner at the Royal Station Hotel, Newcastle-upon-Tyne, on Wednesday, October 2nd (not October 1st as originally announced), for the purpose of welcoming **Lt. Col. S. E. Monkhouse,** M.I.E.E., as a new member of the Association on the occasion of his retirement from the managing directorship of the North-Eastern Electric Supply Co. **Mr. J. R. Beard,** M.Sc., M.I.E.E., vice-president of the Association, will be in the chair.

Sir Edwin Herbert has been appointed a director of the Broadcast Relay Service, Ltd.

Major W. Lewthwaite, M.C., who has been in charge of the Buying Department of the Witton group of engineering works of the General Electric Co., Ltd., for the past thirty-five years,

Major W. Lewthwaite

Mr. A. J. D. Krause

retired on July 31st. He will, however, continue to act as chairman of the G.E.C. Buyers' Conference, which is attended by representatives of the various factories of the G.E.C. and its associated companies. He is a past-president of the Purchasing Officers' Association of Great Britain. Major Lewthwaite served from 1914 to 1918 in the Machine Gun Corps, being awarded the M.C. and mentioned in dispatches (he was severely wounded), and from 1939 to 1942 he was second-in-command of the 11th Warwicks.

Mr. A. J. D. Krause retired from the G.E.C. on July 31st, after fifty-one years' service of which the greater part was spent as works manager of the company's switchgear works at Witton. Mr. Krause joined the company in 1895 and was transferred to the Peel Works (then the main G.E.C. factory) at Salford; at this period the consumers' supply voltage was being changed over from 100/125 to 200/250 volts, and the consequent redesign of electrical accessories was Mr. Krause's main concern. In 1905 he started a new department for the manufacture of house service cut-outs, switches, fans, searchlights, etc., and four years later this department was transferred to Witton. Expansion was rapid, and in 1911 Mr. Krause took charge of the house service cut-outs and switch section, which became the new Switchgear Department. To mark his resignation, the workpeople have presented him with a suitably engraved cigarette box and his staff colleagues have given him a wireless set. Mr. Krause has been succeeded by **Mr. J. Donkin,** B.Sc., A.M.I.E.E., A.M.I.Mech.E., who has been an assistant works manager at the switchgear works for the past ten years.

Mr. R. P. Wingate, who has recently been demobilized from the R.A.F. after six years' service, has resigned his position as assistant public lighting engineer to the North Eastern Electric Supply Co., Ltd., to join the Advisory Lighting Service of the British Thomson-Houston Co., Ltd., as lighting engineer at the Newcastle office.

Mr. F. D. Sarjeant, for forty-three years shift engineer at the St. Peter's power station of the Isle of Thanet Electric Supply Co., Ltd., has retired. He joined the company in 1903 when it was purely a traction company, operating the Thanet tramways which were scrapped in 1937.

Mr. Alexander Maxwell has retired from the position of director of engineering of the Edison Electric Institute after fifty years' association with the electrical utility industry in the United States. He is succeeded by his principal assistant, **Mr. Harry Kent,** who has been with the Institute and its predecessor, the National Electric Light Association, since 1924.

Lt. Col. S. Mortimer, R.E., has been appointed municipal electrical engineer and transport manager, Penang, Malaya, and is now being released from the service. In 1924 Col. Mortimer, who was with the Yorkshire Electric Power Co., went to Malaya to take up his first appointment with the Penang Municipality, with whom he served until the war came to Malaya, when he was commissioned in the Royal Engineers. Returning to Malaya early in September, 1945, he was appointed C.R.E. 136 Works (Malaya) and was responsible for the early rehabilitation and operation of electrical undertakings throughout Malaya under the British Military Administration.

Lt. Col. S. Mortimer

Mr. J. Chadwick, A.M.C.T., A.R.I.C., has resigned his position as manager and chief chemist to the Lloyd Chromium Plating Co., Failsworth, Lancs, to take up an appointment as technical representative with R. Cruickshank, Ltd., electroplating engineers, Birmingham.

About 3,000 people attended the seventh annual sports day held by the sports and social organization of Automatic Telephone & Electric

Co., Ltd., at Liverpool on August 17th. The weather was kind for this meeting, the first the company has held since 1939, and the presence of many of the employees' wives and families made it as much a social affair as a sporting occasion. The A.T.M. Silver Band played selections throughout the afternoon. The organizing officials had almost as strenuous a time as the competitors in ensuring the smooth running of an extensive programme. Interdepartmental competition was keen for the "Gann" trophy, which was won by Department 01 (Tools and Methods). A baby show and an ankle contest were popular events. The prizes were presented by Lady Eades, wife of Sir Thomas Eades, vice-chairman and managing director of the company.

Lady Eades, accompanied by Sir Thomas Eades, vice-chairman and managing director of the Automatic Telephone Co., Ltd., presenting the prizes at the company's annual sports

Vice-Admiral C. Holland, C.B., who commanded H.M.S. *Ark Royal* during the war, has joined A. C. Cossor, Ltd.

Sir Claude Gibb, chairman of C. A. Parsons & Co., Ltd., has left for Australia on a business expedition.

Mr. A. G. W. Goulding has resigned his appointment as director of the General Lighting Equipment Co., Ltd., and has been appointed manager of the electrical department of Smith & Son (Stoke Newington), Ltd.

Councillor Mrs. S. Buckley, J.P., of Blackburn, who has been selected as Blackburn's new mayoress for 1946-7 is the mother of Mr. W. Buckley, mains superintendent in the Luton Corporation Electricity Department. Mrs. Buckley is a member of the Electrical Association for Women.

Glasgow Corporation Transport Committee has reported the resignation of **Mr. W. M. Hall,** automobile engineer, on his appointment as deputy general manager of the Liverpool Corporation Transport Department which we reported in a recent issue.

Mr. C. E. Dryden, formerly of Scarthoe, Grimsby, who has been with the Huddersfield Corporation Electricity Department for some years, has been appointed electrical inspector with the Bedford Corporation Electricity Department.

Appointments Vacant.—Among the vacant positions advertised in this issue are the following:—Burgh electrical engineer for Oban; electrical engineer and manager for Leek Urban District Council; mains superintendent for King's Lynn; two assistant engineers for the Middlesex County Architect's Department (salary £545, plus bonus of £60); cable engineer (£750-£850), and transformer engineer (£750-£850) for the Central Electricity Board; Chair of Electrical Engineering at the University of Birmingham (£1,650).

Obituary

Mr. Matthew Stevenson, who has died at Kilmarnock, was the senior partner in the firm of Messrs. R. Stevenson & Sons, electrical engineers.

Mr. Arthur Grocott, representative of the Edison Swan Electric Co., Ltd., in the Leeds area, died on August 22nd. He had served with the British Thomson-Houston & Ediswan companies for twenty-eight years in the West Riding area.

Will.—**Mr. Francis Joseph Clayton,** electrical engineer, Keighley, left £3,337, with net personalty £3,288.

Electrical Benevolence

DURING the year ended December 31st last the Electrical Industries Benevolent Association received many substantial gifts from firms and individuals in the industry and these are set out in the Year Book just published by the Association. It is seen that the total income rose from £21,355 to £23,051. At the same time the expenditure increased from £15,056 to £16,779, leaving a balance of £6,272, against £6,299. A curve included in the Year Book shows how the amounts paid out yearly to beneficiaries have risen since 1932; the 1945 total was £12,151.

The sympathetic and practical way in which the Association renders assistance is again demonstrated by the stories of actual cases which have arisen during the year.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Fluorescent Lighting Effects

RECURRING headache, with its concomitant ill-health due to eye strain by the use of fluorescent lighting, is mostly attributed to the low lighting intensity and wrongly placed or designed fittings, a defect common to all forms of illumination.

The short wave-lengths of ultra-violet radiation generated in these tubes are regarded as a further cause of distress. The frequency alternations, of fifty cycles, flash distinctly to the eye in a cold gas tube. The hot wire of a filament lamp retains its heat and damps out the effect of periodicity. This flashing would seem to be the real cause of strain to the muscles of the eyes, focusing to rapid pulsations of extreme light intensity. This adverse effect is multiplied when the vision is trained on some object revolving at synchronous speed or oscillating at certain functions of the periodicity.

Sheffield. H. H.

Shortage of Supplies

VARIOUS reasons and excuses have been put forward for the extreme shortage of electrical accessories, cables and apparatus, none of which is satisfactory to harassed contractors.

It is also very strange that while multiple stores, ironmongers, drysalters, and even pawnbrokers, are able to make a good display of electrical goods, when contractors appeal to manufacturers and wholesalers for a share of these things, they are unsuccessful.

Contractors are already having to dispense with staff due to the continued delay in deliveries and if something is not done to improve this position very quickly, mass unemployment will be inevitable.

Glasgow. ALEX. MILNE, SENR.

Electricity Supply Loans

Eight Years' Sanctions Reviewed

STATISTICS have been issued by the Electricity Commissioners of the loans sanctioned by them on the application of electricity supply authorities from 1938-39 to 1945-46 inclusive. The first table relates to public authorities excluding the Central Electricity Board. It shows that in 1938-39 the total amount sanctioned was £25,288,803, the principal items being £8,107,154 for mains and services and £6,125,393 for generating plant. There was a drastic reduction in expenditure during the war, the totals being as follows:—1939-40, £18,900,815; 1940-41, £17,760,500; 1941-42, £6,998,291; 1942-43, £9,184,592; 1943-44, £3,113,953. In 1944-45, however, the pre-war figure was exceeded, the total being £28,337,818, of which loans for generating plant accounted for £20,323,383. The 1945-46 total of £37,652,375 was swollen by sanctions to loans applied for by the North of Scotland Hydro-Electric Board to the extent of £8,931,760, which included £6,300,000 for buildings (generation) and £2,450,000 for generating plant.

A separate table shows sanctions to borrowing by the Central Electricity Board, the annual amounts being as follows:—1938-39, nil; 1939-40, £1,000,000; 1940-41, £1,000,000; 1941-42, £4,000,000; 1942-43, £9,700,000; 1943-44, £2,250,000; 1944-45, £2,025,000; and 1945-46, £100,000. The 1941-42 figure relates to the loan advanced by the Treasury in respect of war emergency extensions. The high total shown for 1942-43 was mainly in respect of expenditure on the grid system incurred substantially before the war and it also included a sum of £900,000 covering the extension of the Earley station. The original instalment for this station was included in the sanction to the borrowing of £4,000,000 for war emergency stations, but the extension is not included in the Treasury advance. A further extension of the Earley station was provided for to the extent of £1,075,000 in 1944-45.

A third table shows the total amounts sanctioned each quarter during the eight years.

ASLIB Conference

THE 1946 conference of the Association of Special Libraries and Information Bureaux will be held from September 13th to 15th, 1946, at the Fyvie Hall, of the Regent Street Polytechnic, London, W.1. A conversazione and tea for members will take place on Friday, September 13th, at 4 p.m., followed by the annual general meeting at 6 p.m. Formal proceedings will open on the following morning at 10.30 with an opening address by Sir Reginald Stradling, C.B., M.C., D.Sc., F.R.S., president-elect of Aslib. The afternoon proceedings will include two papers on information services in relation to industry, one by Sir Arthur Fleming and Miss B. M. Dent, of the Metropolitan-Vickers Electrical Co., Ltd., and the other by Professor R. S. Hutton. In the evening a paper on machines and tables will be given by Dr. L. J. Comrie of the Scientific Computing Service.

Sunday's discussions will be on documentation in Europe, technical dictionaries and glossaries, and the setting up of a film library.

Most of the papers will be circulated in advance to those who apply for them, at a cost of 5s. per set. The inclusive fee will be £1 10s. for members and £2 for non-members. Full details can be obtained from the Aslib Office, 52 Bloomsbury Street, W.C.1.

Overseas Electrical Trade

Recovery During July

IN June last, in common with most other classes, exports of electrical goods, apparatus and machinery were halted in their upward movement mainly because of the loss of four working days. Last month the trend was resumed and electrical exports went up by about £1¼ million as compared with June; the total was nearly £3 million above the monthly average of 1938.

Reference to Table I discloses that the rise in the total to £4,795,283 was contributed to by most of the individual items. The most noteworthy increase was in radio apparatus which by rising from a 1938 monthly average of £149,593 to £670,768 became the largest specified item. At the same time the allied class, telegraph and telephone apparatus, also rose from the pre-war monthly average of £242,716 to £449,052. British India was an outstanding customer for radio equipment (£99,571); South Africa's share was valued at £69,730 and that of Sweden at £52,530. South Africa took the largest quantity of telegraph and telephone apparatus (£57,599), Australia (£51,518) being second.

The cable group as a whole showed an advance from the 1938 monthly average of £359,881 to £1,187,631 in July, the most outstanding rises having occurred in the submarine and non-rubber-insulated sections. South Africa appears to have been the leading importer of British cables with India a close second. Argentina took non-rubber-insulated cables to the value of £47,332.

There were several other noteworthy

TABLE I.—ELECTRICAL EXPORTS AND IMPORTS

Class	Exports			Imports		
	July, 1946	July, 1945	Monthly Av., 1938	July, 1946	July, 1945	Monthly Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables, submarine	66,286	45,746	17,289			
Ditto, not submarine	373,758	40,515	71,803	2,608	52,436	31,246
Wires and cables other than telephone and telegraph, rubber insulated	267,230	417,727	117,533			
Ditto, insulation other than rubber	480,357	168,949	153,256			
Radio apparatus	670,768	131,828	149,593	332,587	1,249,838	75,160
Telegraph and telephone apparatus other than radio	449,052	125,268	242,716	1,248	33,854	9,243
Electric carbons, furnace	*	*	*	6,718	53	4,054
Other electric carbons	*	*	*	6,333	6,495	2,301
Electric lamps	132,290	75,325	49,440	80	788	10,265
Other lighting apparatus	192,480	41,319	48,565	911	49,455	38,662
Primary batteries	39,748	12,046	13,572	16	16,790	3,549
Accumulators, portable	132,800	41,183	28,874	*	*	*
Ditto, stationary	20,652	3,591	19,773	*	*	*
Ditto, parts and accessories	60,506	19,561	*	*	*	*
Electric cooking and heating apparatus	101,756	22,000	30,664	*	*	*
Commercial electrical instruments, including ammeters, voltmeters, etc., and parts	49,147	17,974	15,878			
House service meters	49,690	12,835	15,791	9,471	26,247	32,057
Other electrical instruments	44,729	5,254	9,612			
X-ray apparatus, vacuum tubes and parts	83,229	8,963	4,881	23,406	11,844	9,734
Insulating materials, not elsewhere specified	113,022	28,883	19,343	*	*	*
Unclassified electrical goods and apparatus	322,045	113,791	110,615	10,539	464,401	42,630
Generators, complete, up to 200 kW	86,391	25,572	38,071	*	*	*
Ditto, over 200 kW	154,468	12,571	119,079	*	*	*
Ditto, parts	47,221	—	*	*	*	*
Motors	269,752	93,253	145,045	5,484	16,542	26,033
Convertors and transformers	151,810	88,097	101,304	*	*	*
Rectifiers for power-house use	11,994	1,934	3,463	*	*	*
Motor starting and controlling gear	88,805	39,168	50,866	*	*	*
Switchgear and switchboards other than telegraph or telephone	171,810	121,963	184,533	*	*	*
Other electrical machinery	14,381	5,035	15,497	3,000	263,023	14,455
Electric vacuum cleaners	99,532	7,513	26,662	85	20	7,519
Other electrically-operated portable appliances	49,574	3,742	10,394	3,840	2,066	17,108
Total	4,795,283	1,731,606	1,814,112	406,326	2,193,852	324,016

* Not classified separately.

increases and reference may be made particularly to cooking and heating apparatus (from £30,664 pre-war monthly average to £101,756); X-ray apparatus (from £4,881 to £83,229); electric lamps (from £49,440 to £132,290); and insulating materials (from £19,343 to £113,022).

In the machinery section the increase in value was not so pronounced; the total rose from £657,858 to £1,096,622, the principal advance being in motors—from £145,045 to £269,752.

Actually the exports of this class were less in volume than pre-war, the figures being 3,514 tons in July against 3,720 tons as the 1938 monthly average, generators being the only item showing an increase. Shipments of generators to India were up (from £23,626 to £82,509) but this was offset by falls in exports to South Africa from £39,992 to £5,908 and to Australia from £28,606 to £16,536. Exports of generators to foreign countries made a good advance—from £25,112 to £138,677.

As regards motors, India was the principal customer taking £67,470 in July, against a 1938 monthly average of £17,920. New Zealand's share amounted to £21,039 (against £6,061). Shipments to Australia declined but against this there was a rise from £44,725 to £94,983 in exports of motors to foreign countries.

Taking electrical goods as a whole, South Africa was the leading buyer (£483,771), followed by India (£412,523) and (some way behind) by Australia, Denmark, New Zealand, Spain, Belgium, British Malaya, Egypt, China and Palestine—all over £100,000.

Although imports shrank considerably as compared with July last year, the total of £397,842 was still above the pre-war monthly average, due to heavier purchases of radio apparatus. The only other substantial item was X-ray apparatus.

TABLE II.—DISTRIBUTION OF EXPORTS OF ELECTRICAL GOODS AND APPARATUS

Destination	July, 1946	July, 1945	Monthly Av., 1938
	£	£	£
Eire	51,123	44,864	37,562
Channel Islands	44,800	11,184	11,965
Palestine	101,202	19,852	8,371
British West Africa	43,988	24,819	12,864
Union of South Africa	483,771	94,653	157,602
Southern Rhodesia	21,532	8,275	9,574
British East Africa	18,690	42,472	7,830
British India	412,523	229,104	122,928
British Malaya	117,420	—	32,280
Ceylon	26,347	6,112	14,931
Hong Kong	38,461	—	12,874
Australia	161,198	165,838	196,823
New Zealand	124,419	79,485	95,851
Canada	9,618	38,154	12,482
British West Indies	11,668	5,230	12,887
Other British Countries	84,114	28,307	26,336
Soviet Union	41,517	342,000	36,780
Finland	42,758	—	5,824
Sweden	92,161	1,856	13,735
Norway	66,497	2,573	12,582
Denmark	138,390	—	18,282
Poland	19,727	—	9,626
Netherlands	84,085	—	20,190
Belgium	117,483	12,073	10,874
France	60,666	3,249	15,674
French West and Equatorial Africa	1,059	3,049	400
Switzerland	17,748	—	3,572
Portugal	78,328	3,320	6,498
Portuguese East Africa	4,422	—	6,924
Spain	117,494	11,095	3,808
Italy	2,113	2,996	5,659
Czechoslovakia	9,743	1,067	7,205
Yugoslavia	20,131	—	1,471
Greece	24,822	214	4,888
Roumania	—	—	13,350
Turkey	51,905	708	7,633
Egypt	114,741	46,298	12,872
Iraq	79,072	2,651	5,456
Iran	99,015	26,575	16,330
China	113,849	—	4,042
United States of America	9,196	7,209	5,546
Chile	18,830	364	6,635
Brazil	26,915	2,879	11,123
Argentine Republic	99,916	26,863	45,387
Other Foreign Countries	346,088	37,370	33,672
Total	3,649,545	1,332,758	1,119,200

Street Lighting

Ministry of Transport Assumes Control

IN a circular to public lighting authorities the Minister of Transport announces that his Ministry has become the central authority for street lighting and has taken over from the Home Office the allocation of iron, steel and timber for street lighting equipment. The Minister asks the authorities to give special consideration to the securing of reasonable uniformity in lighting standards as a means of removing a source of danger and inconvenience to road users. In this connection Mr. Barnes urges the adoption as soon as practicable of the recommendations which were made by the 1937 Departmental Committee on Street Lighting.

Necessary authorization of street lighting schemes under Defence Regulation 56A will be issued by the Ministry of Transport, except for schemes on new housing sites or streets other than public highways which will be dealt with by the Minister of Health and the Secretary of State for Scotland.

The Minister stresses the need for continued economy in street lighting, pointing out that the measurers taken last winter resulted in the halving of the pre-war rate of fuel consumption. It is thought that this economy should be achieved by turning out street lights at midnight wherever practicable, rather than by reducing reasonable standards of lighting.

COMMERCE and INDUSTRY

Fuel Economy Conference. Mr. Shinwell in Scotland.

Model Engineer Exhibition

ADDED skill and greater scope of activities resulting from wartime experiences are conspicuous at the first Model Engineer Exhibition held since 1938. Organized jointly by Percival Marshall & Co., Ltd. (proprietors of the *Model Engineer*), the Society of Model and Experimental Engineers and the Society of Model Aeronautical Engineers, this is the twenty-first exhibition of its kind and the first to benefit by the additional space made available by a change from the old to the new Horticultural Hall, Westminster. Probably the most spectacular exhibits from the electrical point of view are a replica of a modern cinema, complete with coloured stage lighting and screen showing 16 mm films, and a model of a London Passenger Transport escalator. In addition to a profusion of electrically operated trains, trams, trolley-buses, ships, etc., electrical items include a minute mains-driven electric motor measuring only about ¼ in. across, a vertical steam-driven dynamo set, an electric clock and a table lamp. Apart from the association and private exhibits there are about fifty trade stands on which may be seen not only complete models but also their various components, tools and other workshop materials, drawing office equipment, etc. The exhibition closes to-morrow, August 31st.

New Broadcast Transmitters

A new 100-kW broadcasting station has recently been opened in Ceylon by the Army Welfare Service. The contract was placed during the latter period of the war with Marconi's Wireless Telegraph Co., Ltd., and the company's 100-kW short-wave broadcast transmitter, Type TBS.801, was installed on a site near Colombo.

Marconi's have also received a contract (valued at £40,000) from the South African Broadcasting Corporation for six additional transmitters. The equipment will consist of the company's standard 5-kW medium-wave broadcasting equipments, Type TBM.671. The first two equipments, which are now under construction at the Marconi Works at Chelmsford, are due for dispatch by the end of September, and will be installed by the South African Broadcasting Corporation's engineers on sites near Johannesburg. The remaining four, to be dispatched in the spring of 1947, are destined for Cape Town and other sites.

World Fuel Conference

By invitation of the Netherlands National Committee, the Fuel Economy Conference of the World Power Conference will be held at The Hague, Holland, from September 2nd to 10th, 1947. A two-days' visit is to be made to the Netherlands State Coal Mines at Lutterade. Further particulars may be obtained from the British National Committee, World Power Conference, 36, Kingsway, London, W.C.2.

The first of a series of reports on fuel economy since 1939 in the United States has been prepared by the National Committee of that country and is obtainable at 6d. net from the address given above.

"Electrical Review" Index

Readers who require the index to Vol. CXXXVIII (January-June, 1946) should apply for copies to the Publisher, *Electrical Review*, Dorset House, Stamford Street, London, S.E.1.

Bristol Electricity Headquarters

Development of the Bristol Corporation Electricity Department's future headquarters in Colston Avenue is to begin in the autumn. Except for part of the top floor, which is used by the department as a meter and test room, the building is at present occupied by the Bristol Aeroplane Co., for workshops. The company, however, is expected to vacate the building at the end of September or October. It is anticipated that the transfer of the main offices and showrooms from Dorset House, Clifton, will take place piecemeal, and will occupy eighteen months to two years altogether.

New I.M.E.A. Address

Having been unable to secure a renewal of the lease of its headquarter offices at Wellington House, Strand, the I.M.E.A. has taken temporary offices at 254-260, Earl's Court Road, London, S.W.5. The telephone number is Frobisher 2232, Ext. 12.

Communications in Wartime

In the modern world speed of communication is of the first importance; in wartime it becomes vital. Proof of this is provided by the story of Cable & Wireless, Ltd., told in a book entitled "The Thin Red Lines," by Charles Graves, published by the Standard Art Book Co., Ltd., 10, Great Queen Street, W.C.2 (184 pp., 27 illustrations, 5s.). This follows the course of the war from beginning to end, showing how the company's services entered into practically every phase and operation.

Hospital Electrification

In our article on the Queen Elizabeth Hospital on August 16th some of the equipment of the Physiotherapy Department was described as being supplied by "Sollux, Ltd." Actually it was made by Hanovia, Ltd., whose registered trade mark for infra-red lamps is "Sollux."

Imports into Ceylon

The Government of Ceylon has inserted the following items, among others, in Open General Licence No. 4 (applicable to the British Empire except Canada and Newfoundland):—Electric telegraph and telephone instruments and apparatus (except batteries) other than wireless apparatus; electric control and switchgear; electric generators, alternators, dynamos and

exciters; electric motors; electric transformers and convertors; and machinery falling under the heading " Electrical machinery not elsewhere specified " in Class III, Group G, of the classification in the Ceylon Customs Tariff.

Radio Newspaper

When the *Queen Elizabeth* sails from Southampton on October 16th on her first " civilian " voyage her passengers will have the benefit of the latest news picked up by radio and printed in the *Ocean Times*. This newspaper will be the first to reappear among the newspapers which were published at sea on a number of the larger vessels before the war. The *Ocean Times* is published by Wireless Press, Ltd., one of the Associated Iliffe group.

Welding Light Alloys

A symposium on the welding of light alloys is being organized by the British Welding Research Association on October 16th and 17th in the Henry Jarvis Hall of the Royal Institute of British Architects, 66, Portland Place, London, W.1. The four sessions will deal with (1) development of high strength aluminium alloys for welding; (2) pressure welding and flash welding of light alloys; (3) spot welding of light alloys; and (4) the welding of magnesium alloys. There will be demonstrations and exhibits at the offices of the Association, 29, Park Crescent, W.1. Although accommodation is limited a certain number of tickets will be available upon application to the Association.

New Simplex Bristol Premises

Among the many Bristol buildings destroyed during the war was the Victoria Street branch of the Simplex Electric Co., Ltd. The company has since occupied temporary quarters at Bedminster Parade, but has now opened new offices and stores at Nos. 1, 3 and 5, Lawrence Hill, Bristol, 5 (telephone: 57811-12; telegrams: " Simplex, Bristol "). Fully comprehensive stocks will be laid down as soon as supplies permit.

Coil Winder—Correction

An inaccuracy in our description of the " Quickway " coil winder (*Electrical Review*, August 16th, p. 276) is pointed out by the Midland Dynamo Co., Ltd. The two uprights which support the shafts of the rotor to be wound are not clamped to the bench, as stated, but are part of the machine itself, the whole of which is self-contained and suitable for mounting on any existing bench.

Mr. Shinwell's Scottish Tour

On August 19th Mr. Shinwell, Minister of Fuel and Power, inspecting the power and heat plant at the Kirkcaldy works of Michael Nairn & Co., Ltd., said that he thought that if a similar process for heating and power could be adopted throughout industry they could estimate a saving of 30,000,000 tons of coal a year. The combined power and heating plant thermal efficiency average is claimed to be 67 per cent.

Continuing his Scottish tour Mr. Shinwell visited Dumfries-shire on August 22nd, when in company with Mr. W. M. Bell Macdonald, the convener of the Electricity Committee, Mr. J. S. Pickles, county electrical engineer, and other officials he made a survey of the county's electricity scheme by which 9,000 homes are receiving supply and 751 farms were using electricity. Later he described the Dumfries-shire scheme as the most perfect example of electricity distribution there was in the country, and said the cost to the consumer seemed extremely reasonable. From what he had seen of the Dumfries-shire scheme he was convinced that electricity generated and distributed on a national scale, with the provision of autonomy in the areas, and with due regard to the need for maintaining local and personal contact, was going to be a most profitable undertaking for the State.

London Factory in Wartime

An attractively produced and illustrated book of 76 pages entitled " Morgans at War " records the production of a variety of equipment, much needed in wartime, in spite of constant evening attack from the air. It is the story of one of many factories in London's several target areas when the workers had to be convinced that the making of " bits and pieces," seemingly so insignificant, helped to form the thread which completed the grand pattern. This vignette of the war as seen from the riverside factory of the Morgan Crucible Co., Ltd., includes charts which throw interesting sidelights on the volume and variety of production.

Reports on German Industry

Among the latest reports by investigating teams upon various departments of German industry are the following. A few copies are available from the Stationery Office at the prices shown and the reports may also be seen at a number of the principal libraries:—B.I.O.S. 567, " Resistors and Fixed Capacitors Produced in Germany " (7s. 6d.); C.I.O.S.I-1, " Radar and Controlled Missiles " (5s. 6d.); F.I.A.T. 224, " Survey of Electrical Control Devices in Germany " (2s. 6d.); F.I.A.T. 670, " Survey of a New Storage Battery " (6d.).

Trade Publications

British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2.—Illustrated brochure (No. 205) on capacitors for power factor correction above and below ground in coal mines.

Aerialite, Ltd., Castle Works, Stalybridge, Cheshire.—Price list of cables and flexibles of many varieties.

British Diamix, Ltd., Metrum Works, Beatty Street, Camden Town, London, N.W.1.—Illustrated leaflet on domestic irons, fires and boiling rings; also wholesale and retail price lists.

Imperial Chemical Industries, Ltd., Metals Division, Kynoch Works, Witton, Birmingham, 6.—Brochure classifying and summarizing the physical properties of " Kynal " and " Kynalcore " wrought aluminium alloys, tabulated in eight schedules, to enable constructional engineers and designers to select those alloys most suitable for specific requirements compared with other metals. Also a brochure on " Kumanol," a new copper base electrical

resistance alloy of very low temperature coefficient available as tape, strip and wire which can be readily jointed by welding without special precautions.

Applicants for copies of these publications should write on their firms' business notepaper.

British Trade Mission to Russia

A *Reuter* message from Moscow states that a group of British electrical engineering experts, headed by Sir George Nelson, chairman of the English Electric Co., Ltd., was due to arrive in Moscow on Sunday last and is, according to British sources in Moscow, prepared to discuss "substantial orders." The visit, made at the invitation of the Soviet Government, marks an important stage in the renewal and extension of Anglo-Soviet trade.

New Electricity Poster

The fact that while every other commodity has risen in price since 1931 electricity has dropped by 40 per cent is stressed in a striking coloured poster issued by the Electricity Supply Companies' Public Relations Committee. A graph, printed in nine colours, shows the trend of costs for the last fifteen years of coal, materials, wages, cost of living, and electricity. At the foot appears the message "Don't Nationalize Sound Enterprise." Copies may be obtained from the Electricity Supply Companies' Public Relations Committee, c/o Mr. Hubert Williams, 32, Great Ormonde Street, W.C.1.

Trade Announcement

The Agro Electrical Co., Ltd., informs us that the arrangement by which its sales were conducted by T.M.C.-Harwell (Sales), Ltd., has now ceased and it has established its own sales organization under the management of Mr. C. J. Abercrombie. As from September 2nd, the company's London offices will be at 7, Maddox Street, Regent Street, W.1 (telephone: Mayfair 4068/9).

Municipal Reports

Sheffield

FOR the third successive year the accounts of the Sheffield Electricity Department show a loss, which on this occasion has reached the substantial figure of £181,314. In view of this adverse trend the City Council last March raised the charges. During the war, with a large increase in the power load, the average price received per kWh sold fell as low as 0·55d. (in 1940-41), since when it has risen to 0·66d., a figure which, however, is not much higher than in the last pre-war year—0·615d.—and compares with 0·707d. ten years ago. Revenue from electricity supply in 1945-46 amounted to £2,140,205 (against £2,113,452 in the previous year) and the aggregate income (including that from the motor and installation sections) was £2,222,079 (£2,173,469). Working costs totalled £1,903,659 (£1,821,816) and loan charges £499,735 (£498,109). Against the deficiency of £181,314 is set special income of £99,086, reducing the amount to be transferred from the reserve fund to £82,228.

The report of the undertaking, of which Mr. J. R. Struthers is general manager and engineer, includes a number of graphs comparing the financial and operating figures for the war years. A curve of electricity sold indicates that the peak was reached in 1943-44, the subsequent fall being due to the decrease in the power load. Last year 775·8 million kWh was sold against 835·0 million in the previous year, a decrease of 59·2 million kWh (7 per cent). The number of consumers increased by 1,511 to 166,814.

As regards generation, the maximum demand on the stations rose from 226,400 kW to 233,610 kW, although production fell from 1,187·3 million to 1,077·8 million kWh. The total plant in commission during the year was 292,000 kW. The installation of a new 50,000-kW set at Neepsend is proceeding and three 190,000 lb per hr boilers are also to be installed at the station, two other boilers at Blackburn Meadows being nearly completed at the date of the report.

Sunderland

The past year is described by the borough electrical engineer and general manager at Sunderland (Mr. W. A. Royle) as the most successful since the inception of the undertaking fifty-one years ago. New records were set up for total sales, 97·2 million kWh; revenue (electricity supply), £413,337; net trading surplus, £47,194; and contribution to the rates, £12,500. The quantity of electricity sold was 3·6 million kWh (3·9 per cent) more than in 1944-45, this being accounted for principally by increases of 1·6 million kWh in domestic supplies and 1·2 million for public lighting. Since 1939 sales have risen by 44·2 per cent although, owing to wartime restrictions, the number of consumers has only increased from 26,682 to 28,434. Against a rise of 130 per cent in the cost of coal the average price obtained per kWh sold by the undertaking has advanced by only 13·6 per cent (from 0·899d. to 1·021d. per kWh).

Last year the undertaking generated 150·9 million kWh against 148·5 million kWh in 1944-45. As the maximum demand on kWh sent out fell from 38,850 to 36,980 kW, the load factor improved from 40·66 to 43·24 per cent. The total revenue was £466,367 (compared with £422,787 in the previous year) and working costs amounted to £354,102 (£320,156). After providing for loan charges, income tax, etc., £34,322 (£28,782) there was a net surplus on the year's working of £47,194 (£40,887).

Electricity in Switzerland

Consumption for Domestic Purposes

By "Electricus"

THE Union of Swiss Electricity Undertakings recently published statistical returns of domestic electricity consumption for 1943, which covered about 85 per cent of the total population of 4¼ millions.[1] As in Switzerland the bulk of the domestic supplies is metered and billed according to the use made (different charges for lighting, including small appliances, and for cooking, water-heating, etc.), reliable average consumptions per consumer and per appliance can be worked out for the various uses. Incidentally, present trends are towards abandoning the multiple-tariff system in favour of two-part or block tariffs, with perhaps only one separate meter for the water-heater circuit.

TABLE 1—DOMESTIC APPLIANCES

Appliance	Number per 100 consumers	Average kW rating	Average annual consumption, kWh
Cookers	20·2	5·5	1240
Storage water-heaters	23·7	1·7	2350
Miscellaneous thermal appliances ..	157·0	0·6	93
Small motors ..	25·1	0·22	36
Refrigerators ..	2·7	0·29	390

The accompanying tables are based on the data given in the source referred to. The total number of households involved is 922,000 with an average of 3·9 persons each.

TABLE 2—TOTAL CONSUMPTION AND REVENUE†

Application	Annual consumption			Revenue	
	Total	Per consumer	Proportion	Proportion	Average
	kWh × 10⁶	kWh	Per cent	Per cent	Pence per kWh
Cooking	231·0	250	21·7	14·1	0·9
Water-heating	512·0	555	48·0	14·7	0·4
Miscellaneous thermal	135·0	146	12·7	12·9	1·4
Small motors	8·3	9	0·8	1·3	2·3
Refrigeration	9·6	10	0·9	0·9	1·5
Lighting	170·0	185	15·9	56·1	4·9
Total	1,065·9	1,155	100·0	100·0	1·5

† Converted at the rate £1 = 17·4 fr.

The number of water-heaters installed, as shown in Table 1, is remarkable and is shown in Table 2 to account for nearly half the total domestic consumption. On the other hand, the extensive use of load control and time-of-day tariffs for this purpose makes it possible to quote relatively low rates per kWh, so that the revenue from water-heating supplies accounts for only about 15 per cent of the total. Lighting in turn is responsible for about 16 per cent of the total consumption and 56 per cent of the total revenue.

The overall average of 1,155 kWh per consumer equals the contemporary United States level, though the composition[2] differs ; less than 10 per cent of the consumption there being attributed to water-heating, with about 20 per cent to refrigerators, and 40 per cent to lighting and radio.

As, so far, no reliable information is available in respect of this country, it is difficult to make comparisons. For 1937-38, the Electricity Commissioners' Returns gave an average of 572 kWh per domestic consumer, and it is to be hoped that detailed statistical data for subsequent years will be published before long. The figure for 1943 may be expected to be substantially higher, but a large proportion is used for space-heating. In a recent analysis[3] of the load conditions on the system of the Northmet Power Company, for instance, it is estimated that in 1938-39 over 40 per cent of the total domestic consumption was for space-heating. Detailed statistical information, comparable to that reproduced above, may be expected to emerge from the sampling survey organized by the E.R.A. and referred to in the *Electrical Review* of July 12th, page 52.

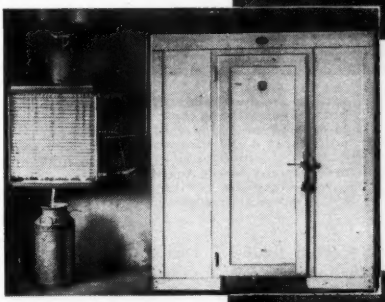
(1) Bulletin A.S.E., 1946, No. 10, p. 263.
(2) Edison Electric Institute Bulletin, August, 1945, p.227.
(3) E.R.A. Report Ref. K/T108.

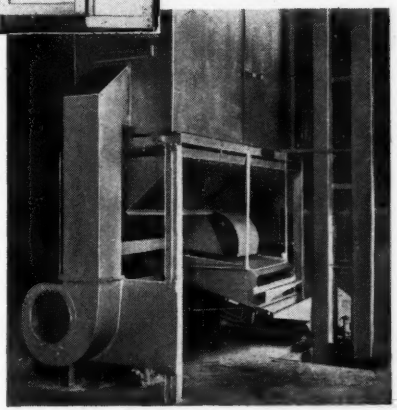
All-Electric Dairy Farming

Comprehensive Pembrokeshire Installation

THERE can be few farms with a more complete and up-to-date electrical installation than that to be seen at Mr. W. L. Davies's farm at Pantyderi, near Cardigan. Keeping a herd of fifty-five Friesian and Guernsey cows (thirty-five now in milk), Mr. Davies has succeeded by electrical methods in reducing manual work to the bare minimum, improving the quality and cleanliness of his milk, and incidentally winning the prize last year for the highest yield in the county for a herd of under twenty full year cows, the Friesian and Guernsey herds being treated as separate herds for the competition.

The layout of the milking parlour, which is equipped with a good fluorescent lighting installation, is systematically designed to ensure that the milking is carried out hygienically, without any handling and in the shortest time possible. The six-unit combine milker, driven by a 3-H.P., 1,430 r.p.m. motor, milking six cows at a time and simultaneously recording the yield. Six more cows await their turn in adjoining stalls, while a similar number is being cleaned in the washing stalls.





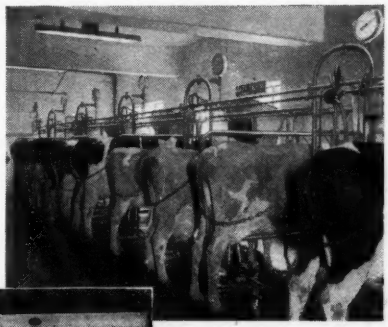
Top: Fluorescent lighting is installed in the milking parlour which is equipped with a six-unit combine milker

Centre: Cooler and 350-cu ft refrigerator for storing milk awaiting dispatch

Right: One-ton-an-hour grain dryer

For cooling the milk, brine from a 350-cu ft "Frozt-ed-Aer" refrigerator (with a compressor driven by a 2-H.P. motor) is passed by a pump ($\frac{1}{2}$-H.P., 1,425 r.p.m. motor) through a cooler, the refrigeration space being utilized for storing the milk awaiting dispatch. A 20-kW G.E.C. electrode boiler provides steam for both sterilizing chest and jets for can sterilizing.

For the purpose of providing the hot water required for washing the dairy utensils there is a 35-gal copper cylinder fitted with three 4-kW immersion heaters, while for heating water required for mixing the calves' food there is a Burco washboiler. Preparation of the cattle food is undertaken with the aid of a

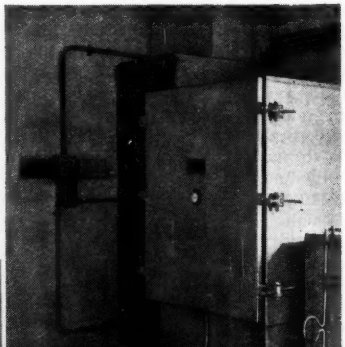


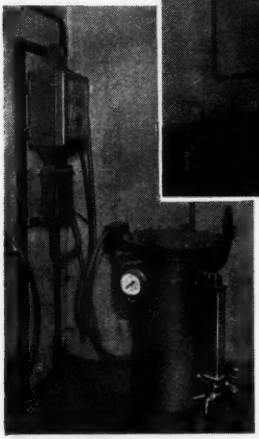
hammer mill (driven by a 15-H.P., 2,500 r.p.m. motor) and a pulping machine (5-H.P., 1,400-r.p.m. motor).

In addition to dairy farming, over 800 acres of arable land are under cultivation. Combine harvesting is adopted, working in conjunction with a 1-ton-an-hour Mather & Platt grain dryer (5-H.P. motor).

An electric lift is shortly to be installed in the granary. A room used for potato sprouting is warmed during frosty periods by six 2½-kW G.E.C. fan-heater units.

The main metal-clad switchboards used to control all this plant has been built up from G.E.C. equipment by the West Cambrian Power Co., Ltd., which has been responsible for installing the apparatus. The total connected load is about 80 kW and the maximum demand is approximately 50 kW. Last year the consumption of electricity for all purposes was 57,040 kWh, the cost being in the neighbourhood of £267.





Above: In the cupboard behind this sterilizing chest is a 35-gal copper cylinder fitted with three 4-kW immersion heaters to provide hot water for washing dairy utensils. Left: Electrode boiler (20 kW) providing steam for sterilizing

Royal Agricultural Show, 1947

PLANS are in hand for the next Show of the Royal Agricultural Society of England to be held at Lincoln from July 1st-4th, 1947. Although the Show will have to be on "austerity" lines compared with pre-war Royal Shows, the Society will do its utmost to provide a worthy representation of livestock and displays of the new machinery which made possible the advance of British agriculture during the war. Special emphasis will be laid on the educational aspects of the Show and the results of recent agricultural research. The showground, which has been placed at the Society's disposal by the City of Lincoln, will occupy 100 acres. The last Royal Show took place in Windsor Great Park in 1939.

"Britain Can Make It"

EFFICIENCY, economy and appearance have all been taken into consideration in the selection of the electrical items which are to be included in the "Britain Can Make It" Exhibition which will be opened by the King at the Victoria and Albert Museum on September 24th. A pre-view of selected exhibits revealed a remarkably high standard of design in all types of apparatus, with manufacturers in many cases showing a tendency not to adhere too closely to conventional ideas and practices.

Ease of cleaning, neat appearance, more even distribution of oven heat, and better control of both oven and hot-plates, particularly at the lower temperatures, are features upon which cooker designers have concentrated mainly. The drop-down oven door appears to be favoured; also the high-level oven which obviates stooping. Kettles are probably the item in which the makers have displayed the most originality and while there many "stream-lined" versions of the more or less generally accepted designs, among apparatus selected are a model incorporating special steam-guard handles and an upright type intended for use on the table as a hot-water jug. Among toasters is a horizontal model suitable for toasting sandwiches.

Practically all the irons have thermostatic control. Streamlining is in evidence and other noteworthy features are pleasing coloured finishes, improved heat distribution over the sole-plate, more rapid heating up, grooved sole-plates which facilitate ironing under buttons, double thumb-rests to help left-handed users, handles specially designed to prevent wrist strain, improved connectors, a swivel device which makes it impossible for the flexible-lead to get knotted or tangled, and a light to illuminate the work. Improved appearance, more efficient and convenient operation, and the incorporation of water pumps are characteristics of the washing machines which are to be displayed.

Among fires there seems a strong preference for the reflector type with rod-type elements and the many attractive designs include several models for wall-mounting in bathrooms, etc. Among the latter is one with an ingenious handle which serves both as a switch and for tilting. Both bakelite and tubular steel have been utilized to good effect in some instances. The appeal of the modern convector with illuminated grilles has also not been overlooked. A refrigerator priced at only £16 will be another attraction.

ELECTRICITY SUPPLY

Revised Glasgow Estimates. New Poplar Power Station.

Colchester.—VILLAGERS PRESS FOR ELECTRICITY.—The Electricity Supply Committee has had to refuse a supply of electricity to eight villages because, it is stated, in present circumstances it is not possible to embark on development schemes. Supplies will be given when it is economic to do so, as soon as the position improves with regard to materials, and the mains generally have been reinforced to carry the additional loads. In reply to further representations regarding the difficulty of carrying on farming with oil lamps and candles it is stated that new houses take precedence for materials.

Glasgow.—REVISED ESTIMATE FOR NEW STATION.—Based on tender prices received for the principal contracts the capital expenditure on the construction of the first section of the new Braehead generating station is estimated at £5,279,000. This is made up as follows: Buildings, £1,110,200; generating plant, £692,000; boiler plant, £2,008,600; coal and ash handling plant, £261,300; circulating water system, £343,500; switchgear, £178,000; general electrical works, £166,500; other works, £39,000; and contingencies, etc., £479,900. The earlier estimate was £4,672,800.

With reference to the decision to accept the tender amounting to £1,180,240 by John Mowlem & Co., Ltd., for the civil engineering and building works the consulting engineers, Merz & McLellan, have reported that it has not been possible to obtain a definite decision from the Clyde Trust on the design of the sections of the quay wall incorporating the inlet and outlet works of the station on account of restrictions likely to be imposed by the Ministry of Civil Aviation on the development of the Clyde Trust lands at Braehead. Consequently it is proposed to delete the river works from the contract and after making allowance for this the amount of the contract is now £1,009,112.

EXTENSION OF STATION.—The Central Electricity Board has directed the Corporation to extend the Braehead station by the installation, ready for commercial operation in September, 1949, of one 50,000-kW (m.c.r.) turbo-alternator set, and two boiler units each of 300,000 lb of steam per hr maximum continuous evaporative capacity. The town clerk has been instructed to make application to the Electricity Commissioners for their consent to the extension and for authority to borrow £2,098,000. The general manager and the consulting engineers are to obtain tenders from C. A. Parsons & Co., Ltd., for the turbo-alternator, Babcock & Wilcox, Ltd., for the two boiler units, and John Mowlem & Co., Ltd., for the construction of any necessary building and civil engineering work.

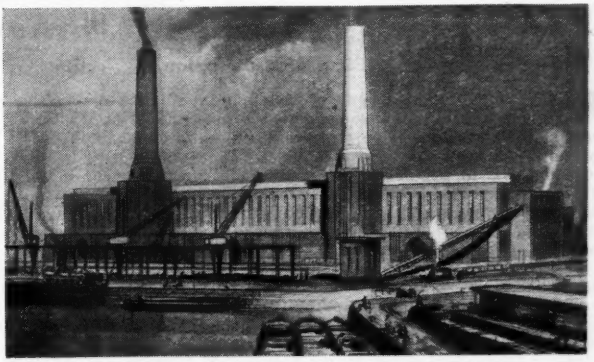
Hull.—STORE BUILDING.—The Electricity Committee has approved a revised estimate of £30,000 for the erection of central stores in Ryde Avenue.

Mansfield.—LOAN APPLICATION.—The Electricity Committee is to apply to the Electricity Commissioners for sanction to borrow £17,750 for laying 11,000-V cables and £2,650 for switchgear and metering equipment in connection with a supply of electricity to the Mansfield Colliery of the Bolsover Colliery Co.

Middlesbrough.—LOAN FOR METERS.—The Town Council has applied to the Electricity Commissioners for sanction to borrow £5,000 for electricity meters.

Oldham.—LOANS.—The Electricity Committee has received sanction to borrow £147,841 in connection with the extensions to the 33-kV ring system. The Committee has applied for sanction to borrow £2,644 for erecting and equipping of an electricity substation at Royton.

Poplar.—NEW GENERATING STATION.—Mr. Robert Illingworth, O.B.E., the borough electrical engineer and general manager at Poplar, has sent us an impression by Mr. J. D. M. Harvey of the borough's new generating station which is to be situated on the site of the present Export Dock of the East India Docks, Port of London Authority. The consulting architects for the exterior are Farmer & Dark, F.R.I.B.A., and the architect is Mr. D. Hubert Lewis. John Bruce & Staff, Swansea, are the consulting engineers, and the civil consultants are L. G. Mouchel & Partners.



Artist's impression of the new Poplar power station

Scotland.—SUBMARINE CABLE-LAYING.—The laying of 11-kV submarine cables under the narrows of the Kyles of Bute and in the Firth of Clyde from Kerrylamont Bay, Bute, north of Kilchattan, to a point on the Great Cumbrae west of Millport, has now been completed. This operation is part of the North of Scotland Hydro-Electric Board's distribution scheme for Buteshire and South Cowal. One new area in Bute has for the past fortnight been supplied with current from an overhead transmission service. Other sections will be served before winter. The Distribution Scheme was authorized in January of this year.

Stirling.—CHANGE-OVER.—The Town Council has approved an expenditure of £18,870 in connection with the change-over from d.c. to a.c. supply.

Torquay.—SUPPLY EXTENSION.—The Electricity Committee is to extend the distribution system at Watcombe, including the provision of a substation, at a cost of £8,607.

Tottenham. — ELECTRIC COOKERS. — The Housing Committee has authorized the purchase of 180 electric cookers from the Northmet Power Co.

Overseas

Belgium.—EMERGENCY FLOATING POWER STATIONS.—In the annual report of the Belgian electrical financing company, "Sofina," it is mentioned that two emergency floating power stations, of American construction, have been in use in Belgium for some time, one at the power station at Schelle and the other at Langerbrugge. The generating plants are mounted on barges measuring about 314 ft in length and 49 ft in width and having a draft of 12 ft. Each barge is provided with oil-fired boilers producing steam at a pressure of 829 lb per sq in., a land-type turbine and a 13,800-V alternator. By means of a 37,500-kVA transformer the power can be stepped up for distribution purposes to either 69, 115 or 138 kV.

New Zealand.—POWER PROJECTS.—Mr. R. Semple, Minister of Works, told the House of Representatives recently that investigations were now being carried out at Coal Crook on the upper part of the Clutha River where it was proposed to build a 300,000-kW power station—the largest single station of its kind in New Zealand. A general survey had revealed that the potential hydro-electric resources of the South Island were three times as great as those of the North Island, and it would ultimately be a question of taking the factory life of the country to where the power was. When the Waikato River had been harnessed, there would be very few other major schemes that could be tackled in the North Island. New Zealand, the Minister pointed out, was depending more and more each year on hydro-electric power.—*Reuter's Trade Service* (Wellington).

Spain.—POWER PRODUCTION.—During recent years, largely due to the great industrial expansion in the country, there has been a marked increase in electric power output, a total of 4,775 million kWh, having been attained in 1944 as compared with 3,111 million kWh in 1939, notwithstanding coal supply difficulties during the war. During both 1944 and 1945 exceptional droughts caused a big drop in the output of the country's hydro-electric installations, but in spite of this the production during last year is estimated to have amounted to 4,067 million kWh.

Street Lighting in Manchester

Plans for Conversion to Electricity

LAST April the Manchester General and Parliamentary Committee submitted a report to the City Council on the street lighting system in which it contended that the case for changing over to electricity was unanswerable. It has now approved a scheme suggested by the Electricity Committee embodying a programme for the conversion of the gas street lighting system to electricity.

The Electricity Committee considers that the initial work should be confined to roads with street traction poles, these for the most part being main roads which are likely to be undisturbed for a number of years. With adequate labour and materials, the lighting of these roads can be converted easily and rapidly by using overhead conductors supported on the poles. The number of lighting points is considerable, but it is estimated that these sections can be completed in about two years. This scheme has the advantage that those units consuming considerable quantities of gas will be dealt with first, thus ensuring early achievement of the maximum fuel economy at a relatively low cost.

It is proposed that the first one or two roads should be dealt with by direct labour so that accurate cost figures may be available, after which consideration could be given to the employment of contractors to accelerate the rate of progress.

Due regard must be paid to the redevelopment proposals so that any road scheduled for widening or closing within the next five to seven years should not be included in the programme, conversion being postponed until the alterations have actually been initiated. Where road excavators are required for additions or alterations to electric cables, the opportunity should be taken to install electric street lighting conductors at low cost, either as a preliminary step or as part of an immediate conversion.

By this scheme the Electricity Committee considers it should be possible to convert the main road lighting to electricity comparatively quickly, leaving the conversion of side roads—particularly in residential areas—to be dealt with progressively in consultation with the other committees concerned.

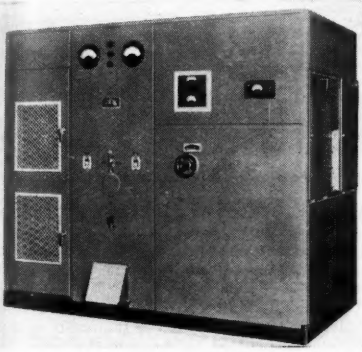
RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

High-frequency Heater

A HIGH-FREQUENCY generator for the eddy current heating of metals and dielectric heating is announced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. The cabinet is self-contained, requiring only connection to power mains, three-phase at 360 to 440 V; an electrical filter minimizes radio-frequency leakage into the mains. The output is 25 kW continuous rating at from 2 to 15 Mc/s, the input approximating to 40 kW at full load.

The one-piece dust-proof body of welded steel has a base-plate fitted with four hoisting bollards. All controls are on the front panel and the interior is partitioned into two sections, the larger containing the power and high-voltage rectifier equipment, while the smaller houses the high-frequency oscillator gear. Access to the former is by a door in the front panel and to the latter through two removable panels on each side of the output terminals, which are recessed on the right-hand side of the cabinet. Both door and panels have "car-door" handles with Yale type locks; in addition, the door has an interlocking key which must be inserted in a socket on the switch panel before the set can be used and, as a further safeguard, the door and panels have electrical safety switches which automatically disconnect the high voltage if they are opened.



Single unit dielectric and eddy current heating generator of 25 kW continuous rating

The self-oscillator employs two ACT16 "Osram" valves in push-pull, with crossed capacity feed-back, while the power supply to the oscillator anodes is taken from a three-phase full-wave rectifier employing six GU21 "Osram" mercury vapour valves. Separate transformers energize the filaments and furnish 240 V for operating contactors and auxiliaries with a voltage stabilizing transformer for the oscillator filaments.

The circuit is fully protected; the large contactor panel also carries an overload protection relay and a cut-out in case of failure of the cooling air supply. The anode circuits of the rectifier valves are fitted with special high-voltage fuses. Controls comprise a rotary "on-off" switch, high-voltage "start-stop" contactor push-buttons and the output power control. Subsidiary controls, also on the front panel, consist of an interlock key switch and contactor buttons for overload trip resetting. A pre-set "high power—low power" switch is situated inside the power compartment door. A Chamberlain & Hookham process timer can be very simply incorporated and the set can be remotely actuated from the working position by means of a control box connected by a flexible lead to a socket on the front panel of the set. The oscillator valves are air cooled by a motor-driven fan, the air intake being through a series of filters and the exhaust passes out through a duct. The G.E.C. is also marketing 5-kW and 1-kW generators of a similar type.

Terminal Blocks

The multi-way terminal blocks for 15 and 30 A offered by the PRECISION COMPONENTS CO., Aller, Langport, Somerset, are made of moulded bakelite with plated brass terminals and screws. Holes for fixing screws are provided between every two terminal segments so that each block can be cut into several sections for twelve one-way, six two-way or four three-way connections.

Telephone Cable

Cable insulated with materials that are more readily obtainable just now than cotton, wax and lead is announced by AERIALITE, LTD., Castle Works, Stalybridge, Cheshire, for internally wiring buildings for private telephone and call-bell communication systems.

This cable is made up of 0·064 in. (central battery) wires, two pairs and one single, insulated with a single layer of vulcanized rubber with a left-hand lay. Around this core are wrapped, with a right-hand lay, twelve pairs of 12·5 lb conductors which are also rubber insulated. One layer of proofed tape is then applied and the whole finally p.v.c. sheathed.

The identification colour code normally used for this class of cable is strictly adhered to by a provisionally patented method, which consists of applying the rubber compound in two different colours, for dual coloured wires; thus a red-green wire will be covered for half

its circumference with red and the other half with green compound. The insulation resistance between pairs, layers and earth averages 1,650 megohms per 1,000 yards at 60 deg F. Other sizes of the same type of cable are to be developed.

Starting Fluorescent Lamps

The interval that elapses between the switching on of a tubular fluorescent lamp and the commencement of its glow represents the time which must be allowed for the anodes to reach their emitting temperature; hence the use of bi-metallic delay switches. The need for the latter can be avoided by the employment of an instantaneous - start ballasting assembly made by BARLITE LAMPS, LTD., Bath Street Works, Hanley, Stoke-on-Trent, whose London distributors are ENGINES & ELECTRICS, LTD., 22, Stafford Place, Westminster, S.W.1.

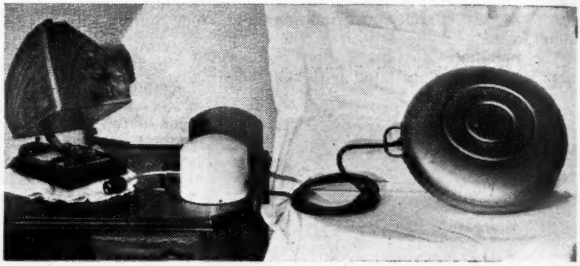
A patented resonant circuit is utilized to apply voltage high enough to ionize the gas within the tube sufficiently to start a glow discharge between the anode plates at both ends of the low-voltage tube. To favour the immediate change-over of the discharge from a glow to an arc with initially cold cathodes, a special surface structure is given to the latter which prevents uniform electronic emission so that, by self multiplication, a hot spot of low-voltage drop is formed on the cathode.

Bed Warmers

Two thermostats are provided for regulating the temperature of the "Bedcomfort" now being made by S. B. JACKSON, LTD., Windsor House, Victoria Street, London, S.W.1, for household and medical uses. The pad is rated at 35 W and is 12 in. square, having a glass-silk cover bag which may be washed in cold soapy water. A flat push-bar switch is fitted 5 ft away from the pad along the flexible connecting cable, an unusually generous length of which is provided—18 feet.

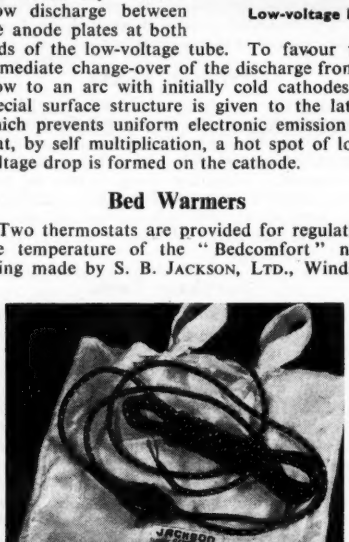
A sheet aluminium bed warmer of large heating area, which is energized at low voltage, is announced under the trade name of "Welec" by FRANK WESTERMAN (WHOLESALE), LTD., 94, Dale End, Birmingham, 4.

The associated step-down transformer, which is plug connected to an ordinary socket outlet, is totally enclosed in a small domed case that can conveniently stand on the bedside table so that the cable lead entering the bed does not have to withstand more than 25 V, the loading being 35 W.



Low-voltage bed warmer, showing transformer on bedside table

The dissipation area of the metal "cushion" is claimed to be so related to the position of the heating element as to prevent the generation of excessive temperatures. For this reason it is considered that thermostatic control is unnecessary.



Thermostatic "Bedcomfort" warming pad

Control Relay

A small magnetic relay of the general purpose type E is being produced by ELECTRO METHODS, LTD., 220, The Vale, Hendon, London, N.W.11, for operating alarms and audible signals, small single-phase motors and lighting circuits, actuated by two-wire push buttons, pressure, float, thermostatic and toggle switches.

The relay's overall dimensions are 2·75 by 2 by 1.5 in., so that it can be mounted in confined space. It is available for d.c. from 1 to 70 V and a.c. from 3 to 250 V, coil consumption being 1 W and 2·75 VA respectively with 2-A rating. The self-aligning solid armature with simplified hinge design has double-pole, double-throw silver contacts; all steel parts are plated. Double purpose solder/screw terminals are provided and in the base there are two fixing holes.

Various modifications include terminal studs for panel mounting and a plug-in model to fit into "international octal" valve holders.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Richardsons, Westgarth & Co., Ltd.—Presiding at the annual meeting held on Monday last Col. H. M. Stobart (chairman) said that while land work at the Hartlepool works was necessarily subordinated to marine during the war a considerable output was achieved. In all, thirteen sets of turbines, one 30,000-kW alternator, ten turbo-blowers and compressors, six gas exhausters and boosters, twelve condensing plants and 196 pressure chargers were completed, and in addition a large volume of work was carried out in the supply of spares and maintenance of existing plants. Contacts with their Swiss associates, Brown Boveri & Co., Baden, curtailed during the war, had now been resumed. Since the end of the war, the Land Department had reverted to its original function, and substantial orders had been received for turbo-alternators, condensing plant, compressors and other auxiliary plant, as well as complete boiler house installations, and before the end of hostilities in Europe provision was made for the urgent restoration of electric power by means of a number of transportable power stations for the Ministry of Supply.

Newton Brothers (Derby), Ltd.—Presiding at the annual general meeting on August 22nd, Mr. P. C. Cooper-Parry, chairman, said that the reduction in the trading profit from £100,367 to £59,558 was to be expected on the cancellation of many Government contracts following the end of hostilities. The adverse effects of such cancellations would be felt more in the current year. During the year considerable progress had been made in bringing plant and machinery up to the latest standards and £16,017 had been spent on new plant. The re-equipment was continuing. Trading was difficult at the moment. The specialized equipment supplied in large quantities during the war was generally of the type required for post-war needs though on a much reduced scale. Their customers for this class of equipment were in process of developing new designs needing in turn new patterns and types which the company's technical staff had to develop through the experimental stages before quantity manufacture could be reached.

J. Stone & Co., Ltd.—In his speech at the annual meeting the chairman (Mr. K. H. Preston) referred to developments on the light metal side of the company's business, which had included the establishment, in conjunction with Fry's Diecastings, Ltd., of Stone-Fry, Ltd., for the manufacture of pressure diecastings in magnesium. An important branch of their work was the production of electrical equipment for railways. Deferred replacement programmes were now being put into effect by the railways and it was expected that this department of their business would be kept busy for some time to come.

Veritys, Ltd., report a net profit, after taxation, of £18,550 for the past year, against £21,658 for 1944. Provision is made for obsolescence, contingencies and deferred repairs, but the directors state that owing to reduction in output, with consequent effect upon earning capacity, they do not propose to recommend a further dividend for the year. (An interim of 7½ per cent has been paid.) A balance of £16,534 (£14,799) is carried forward. Reference is made in the report to the shortage of materials which is handicapping the company's efforts to attain full production.

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., reports a net profit for 1945, before taxation, of £24,090, as compared with £25,500 for 1944. To this is added £11,000 taxation reserve not required. Depreciation reserve receives £14,000, general reserve £9,000, and U.K. taxation absorbs £4,327. As we have already announced, the dividend for the year is raised from 5 per cent to 7 per cent less tax. The balance carried forward is £9,950 (against £9,406 brought in).

Lisbon Electric Tramways, Ltd.—After providing for taxation and transferring £55,000 (same) to general and depreciation reserve the net profit for 1945 was £54,240 (against £78,827 for 1944). Revenue rose by £124,996 but there was a greater increase in working expenses—£149,583—due to higher wages, etc. The final ordinary dividend of 2½ per cent tax free maintains the year's distribution at 5 per cent free of tax, and £35,371 (£41,449) is carried forward.

Aron Electricity Meter, Ltd., announces a trading loss of £33,471 for the year ended March 31st last. In the preceding year there was a profit of £19,266. After allowing for an estimated E.P.T. repayment of £62,576 there is a surplus of £12,563 and it is proposed to pay an ordinary dividend of 10 per cent, against 15 per cent.

Berry's Electric, Ltd., is raising its dividend from 10 to 12½ per cent for the past year.

London Associated Electricity Undertakings, Ltd., is paying an interim dividend of 2½ per cent. No interim was paid last year but the final distribution was 6 per cent.

The Nigerian Electricity Supply Corporation, Ltd., has announced a final dividend of 7 per cent and a bonus of 2½ per cent, making 12½ per cent for the year (against 10 per cent).

The Clyde Valley Electrical Power Co. has declared an interim ordinary dividend of 3 per cent (unchanged).

Telephone Rentals, Ltd., is paying a final dividend of 6 per cent, maintaining the distribution for the year at 10 per cent.

The British Power & Light Corporation, Ltd., is paying an interim ordinary dividend of 3 per cent (against 2 per cent).

The British Oxygen Co., Ltd., is again paying an interim dividend of 8 per cent on the ordinary stock.

The North Eastern Electric Supply Co., Ltd., is maintaining its interim ordinary dividend at 2½ per cent.

The West London & Provincial Electric & General Trust, Ltd., has declared an interim dividend of 2 per cent (unchanged).

The Madras Electric Tramways, Ltd., is again paying a dividend of 10 per cent free of tax.

W. Canning & Co., Ltd., are again paying an interim dividend of 5 per cent.

New Companies

Gudlite, Ltd.—Registered July 15th. Capital, £1,000. To acquire the business of an electrical engineer carried on by J. T. Gullett at Club Buildings, Fair Road, Wibsey, Bradford. Directors: J. T. Gullett and Edith A. Gullett. Regd. office: 14, Fair Road, Wibsey, Bradford.

Electradio Services, Ltd.—Registered July 15th. Capital, £1,000. Manufacturers of, and dealers in, artificial lighting apparatus, electrical plant, wireless, etc. Directors: H. P. L. Langmead, R. R. S. Tiley, and R. J. Y. Tiley. Regd. office: 1, Barrack Road, Exeter.

Jack Lever, Ltd.—Registered July 18th. Capital, £400. Manufacturers, buyers and sellers of radio, television, electronic and sound equipment and electrical appliances, domestic and commercial heating and lighting, etc. Directors: R. Lever, D. Sefton and E. G. Warland. Regd. office: 156, North End Road, West Kensington, W.14.

Allen-Harris, Ltd.—Registered July 23rd. Capital, £1,000. Electrical, radio and television engineers, etc. Directors: W. G. Allen and J. B. Harris. Regd. office: Station Approach, Radlett, Herts.

D. R. Gray, Ltd.—Registered July 24th. Capital, £1,500. Electrical, radio, public works and engineering contractors, floodlighting, stage and theatre lighting engineers, etc. Joint managing directors: D. R. Gray and J. Darling. Regd. office: 25, Oldfield Circus, Greenford, Middlesex.

Grantham Electrical Engineering Co., Ltd.—Registered July 26th. Capital, £1,000. To carry on business as indicated by the title. Directors: J. S. Stokes, Eileen E. Stokes, S. Pask and Monica H. Pask. Regd. office: 21, Watergate, Grantham, Lincs.

Bernard Installations (Electrical), Ltd.—Registered July 30th. Capital, £1,000. To acquire the business of the Bernard Electric Co. carried on by Bernard Schypiro at 265, Cheetham Hill Road, Manchester, and to carry on the business of manufacturers, sellers, hirers, installers and maintainers of electrical goods, etc. Directors: B. Schypiro and S. Rubinstein. Regd. office: 32, Cheetham Hill Road, Manchester.

Philips Transmission, Ltd.—Registered August 14th. Capital, £25,000. To conduct research into, design, manufacture and maintain apparatus and equipment for radiolocation and aiding navigation, etc. Directors: N. Gunn and T. E. Goldup. Regd. office: Spencer House, South Place, E.C.2.

Standard Wholesale Electrical (Supplies) Co., Ltd.—Registered August 8th. Capital, £8,000. To acquire the business carried on by D. M. Mason at 6a, George Street, Croydon, Surrey, as the Standard Wholesale Electrical Co. Directors: D. K. Mason (permanent managing director) and K. D. Mason. Regd. office: 6a, George Street, Croydon, Surrey.

Electrowares, Ltd.—Registered August 14th. Capital, £1,000. Wholesalers and distributors of electrical equipment, manufacturers and distributors of, and dealers in, electric lamps and fittings, etc. Directors: W. E. F. Tipper, A. L. Storey and F. W. Coel. Regd. office: 231, Waterloo Road, S.E.1.

Hackston & Heywood Electric Co., Ltd.—Registered August 13th. Capital, £200. To carry on business as indicated by the title. Directors: E. Hackston and J. H. Heywood. Regd. office: 14, Links Avenue, Failsworth, Manchester.

Laurence Electrical Products, Ltd.—Registered August 7th. Capital, £1,000. Inventors, designers and manufacturers of, agents for, and dealers in, hair waving, drying and dressing machinery and equipment, etc. Directors: S. S. Levy and Marie Windsor. Regd. office: 55, Humberstone Gate, Leicester.

Harry Marsh & Company (Electricians), Ltd.—Registered August 6th. Capital, £1,000. To acquire the business of an electrician heretofore carried on by Harry Marsh at 49, Abbeydale Road, Sheffield. Directors: H. Marsh (permanent) and P. J. Marsh. Regd. office: 49, Abbeydale Road, Sheffield.

Mayor Smith, Ltd.—Registered August 6th. Capital, £1,000. To carry on the business of electricians, electrical contractors, radio engineers, etc. Directors: C. P. Smith and D. R. Mayor. Regd. office: 323, Claughton Road, Birkenhead.

Shaws (Coalville), Ltd.—Registered July 23rd. Capital, £2,000. Electrical and mechanical engineers, manufacturers of, and dealers in, electrical goods, fittings and accessories, etc. Directors: S. W. C. Shaw and R. T. Humphrey. Regd. office: 52, Silver Street, Whitwick, Coalville, Leicester.

Fred Wood (Electrical), Ltd.—Registered August 16th. Capital, £1,200. To acquire the business of electrical contractors and radio engineers carried on by F. J. Wood and P. F. Wood as "Fred Wood & Son" at 295a, Vicarage Road, King's Heath, Birmingham. Directors: F. J. Wood, P. F. Wood and A. J. Slater. Regd. office: 295a, Vicarage Road, King's Heath, Birmingham.

Bland Bros. (Electrical), Ltd.—Registered August 2nd. Capital, £4,000. Electrical engineers and general electrical installation contractors, etc. Directors: H. P. Bland, J. P. R. Bland and G. C. St. G. Bland. Regd. office: 8, Castle Gates, Shrewsbury.

Gillies & Irving, Ltd.—Registered August 3rd. Capital, £1,000. Electrical engineers and contractors, mechanical engineers, etc. Directors: S. H. Gillies and H. Irving. Regd. office: 93, The Albany, Old Hall Street, Liverpool, 3.

Terrett (Engineers), Ltd.—Registered July 31st. Capital, £500. Electrical engineers and contractors, etc. Directors: W. G. Terrett, Doris M. Allison, H. L. Rink and H. Freer. Regd. office: 196, Dawes Road, Fulham, S.W.6.

STOCKS AND SHARES

THE feature in the Stock Exchange markets is the steadiness with which prices are maintained in the face of a pronounced quietude of business in most departments. The cheap money policy of the Government serves to fortify gilt-edged securities, and the effect of the holiday season does not entirely prevent a good deal of money being employed in the purchase of front rank ordinary shares. Nationalization as a cause for nervousness is exercising no particular influence for the time being.

Companies' reports and their dividends are mostly satisfactory. With the re-institution of Stock Exchange fortnightly settlements at the end of November, it is thought that activity will be encouraged.

Electricity Supply

The market in electricity supply shares showed little appreciable reaction to the disclosure of a 6·7 per cent increase in the electricity generated during the first seven months of this year, as compared with the same period of 1945. Investment still requires a return of between 4 and 4½ per cent from the ordinary stocks of the leading supply companies. The lower of those two limits is the yield on Electrical Distribution of Yorkshire, Midland Electric Power, and Yorkshire Electric Power which are all quoted at about 44s. 6d. and receive 9 per cent dividend.

A 4½ per cent return is offered by the three London companies—"Counties" at 44s., "City Lights" at 31s., and London Electrics at 26s. 6d. North Easterns, at 31s., give a similar yield. London Associated Electric have resumed the payment of interim dividends with a distribution of 2½ per cent, which compares with the regular pre-war rate of 3 per cent. The British Power & Light Corporation has raised its interim distribution from 2 to 3 per cent. For last year the company paid a total of 8 per cent (against 7 per cent for the previous year).

Communications

In the Home Railway market, London Passenger Transport "C" has been changing hands at 60, an improvement on the month. Southern Railway stocks have gone back, the preferred being 1 down at 70½, the 5 per cent preference 4 lower at 110½. Cable & Wireless preference shows a gain of 2½ at 117, but Globe Telegraph ordinary reacted 1s. 6d. to 42s. 6d. Marconi Marine Communications and Oriental Telephones are both down, the latter losing 2s. 9d. at 58s. 9d.

Gilt-Edged Ordinary

The market for manufacturing and equipment companies has assumed a position of being almost entirely an investment area. People who put money into British Insulated Callenders and W. T. Henley's ordinary shares, do so with the intention of holding the shares more or less permanently. They are content to accept the modest yield which present prices afford, for the sake of obtaining security and conservation of their capital. The yield on British Insulated Callenders cannot be calculated because, so far, the company has declared only an interim dividend of 4 per cent for the eighteen months ending with this year.

Cable Makers' Shares

British Insulated Callender's financial year ends with the calendar, and it is not expected that the final dividend for 1946 will be announced until next June. Anticipation looks for 7½ per cent, and if this should be realized the yield at 49s., the present price, would be £3 1s. 3d. per cent. Henley's at 28s. 6d. afford 3½ per cent—from which it is evident that hopefulness budgets for a higher dividend on British Insulated than the 7½ per cent just mentioned. Telegraph Constructions at 58s. 9d.—shares are available at that price—give £3 8s. 0d. Johnson & Phillips at 85s. 6d. pay 3½ per cent. A higher yield is obtainable from Siemens, the return in this case being £4 3s. 4d. at 36s.

Metal Industries

Metal Industries have raised the final dividend from 6 to 7 per cent, making 10 per cent for the year. According to the preliminary figures, the year's profits advanced by £28,000 to £295,000. Among the company's interests are all the ordinary stock of Electrical Switchgear & Associated Manufacturers, and nearly one million ordinary stock of the British Oxygen Company. The latter investment appears in the balance sheet at a figure equal to 54s. 8d. per stock unit. The market value is nearer £5 per unit. Igranic Electric is another subsidiary of Metal Industries.

British Thermostat Capital

Dealings began last week in the 4½ per cent preference shares offered at 21s. to ordinary shareholders of the British Thermostat Co. At the premium of 1s. 6d. at which the new shares are changing hands, the yield works out at exactly 4 per cent. The ordinary capital of the company is £150,000, and it has received annual dividends of 18½ per cent for the last eight years. The new preference capital is the only prior charge.

Manufacturing and Equipment

In the higher-priced shares of the equipment group, International Combustion at 9½ are 5s. down since a month ago. Midland Manufacturing put on ¼, rising to 8¾. Hopkinsons at 5½ are the fraction lower. General Electrics show a fall of $\frac{7}{16}$ at 5 $\frac{1}{16}$, but the 6½ per cent preference at 37s. 6d. are up 1s. Ever Ready have been a dull market, easing off to 47s. 6d. English Electric at 63s. 6d. and Enfield Cable at 60s. 6d. are both up 1s. A sharp fall in Aron lowered

(*Continued on Page* 355)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price Aug. 23	Month's Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole	12½	12½	64/–	..	3 18 2
British Power and Light	7	8	32/–	..	5 0 0
City of London ..	6	7	31/–	+6d.	4 10 4
Clyde Valley ..	8	8	40/6	+6d.	3 19 0
County of London	8	10	43/–	+1/–	4 13 0
Edmundsons ..	6	6	27/6	..	4 7 3
Elec.Dis.Yorkshire	9	9	44/–	+1/–	4 1 9
Elec. Fin. and Securities ..	13½	15	60/–	+1/–	5 0 0
Elec. Supply Corporation ..	10	10	44/–	+6d.	4 11 0
Lancs. Light and Power ..	7½	7½	31/6	..	4 15 3
Llanelly Elec. ..	6	6	26/–	..	4 12 4
Lond.Assoc.Electric	4	6	25/6	..	4 14 0
London Electric	6	6	26/–	..	4 12 4
Metropolitan E.S.	8	9	42/–	..	4 5 9
Midland Counties	8	8	45/–	..	3 11 1
Mid. Elec. Power	9	9	44/–	+6d.	4 1 9
Newcastle Elec...	7	7	31/–	+1/–	4 10 4
NorthEasternElec.	7	7	30/6	..	4 11 10
Northampton ..	10	10	48/–	..	4 3 4
Northmet Power	7	9	41/–	..	4 7 10
Scottish Power ..	8	9	40/–	..	4 10 0
Southern Areas ..	5	5½	22/–	..	5 0 0
South London ..	7	7	31/–	..	4 10 4
Yorkshire Elec...	9	9	44/–	..	4 1 10
Public Boards					
Central Electricity:					
1963–93 ..	3½	3½	108½	+½	3 4 6
1974–94 ..	3½	3½	107	..	3 0 9
LondonElec.Trans.	2½	2½	100	..	2 10 0
Lond.Pass.Trans.Bd.					
A	4½	4½	125½	+1	3 11 9
B	5	5	120½	..	4 3 0
C	3	3	60½	+2½	4 19 2
Overseas Electricity Companies					
Atlas Elec. ..	Nil	Nil	9/–	–9d.	—
Calcutta Elec. ..	6*	6*	62/6	–1/6	1 18 6
Cawnpore Elec...	13	13	57/3	–2/–	4 10 10
EastAfricanPower	7	7	45/6	+6d.	3 1 5
Jerusalem Elec...	5	5	23/6	–6d.	4 5 1
Madras Elec. ..	4	6	41/3	–9d.	2 18 2
Montreal Power	1½	1½	24½	–1	—
Nigerian Elec. ..	10	12½	43/–	..	5 16 4
PalestineElec."A"	5*	6*	36/–	–1/6	3 6 8
Perak Hydro-elec.	6	7	16/6	–6d.	—
Tokyo Elec. 6%	6	6	38½	+1	—
VictoriaFallsPower	15	19	5⅞	..	3 10 8
Whitehall Inv.Pref.—	6	26/6	..	4 10 7	
Equipment and Manufacturing					
Aron Elec. Ord.	15	10	61/3	–7/6	3 5 6
Assoc. Brit. Eng.	8	12	45/–	–16/3	5 6 8
Assoc. Elec. :					
Ord.	10	10	69/–	–1/–	2 18 0
Pref.	8	8	44/3	..	3 12 5
AutomaticTel.&El.	12½	12½	75/6	–1/–	3 6 2
Babcock & Wilcox	12	12½	65/6	..	3 16 3

Company	Dividend Previous	Dividend Last	Middle Price Aug. 23	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
Baldwin,H.J.(2/–)	10	20	13/3	+6d.	3 0 5
British Aluminium	10	8	43/6	+1/–	3 14 2
British Insulated & Callender's ..	..	..	48/6	+1/–	—
British Rola (2/–)	15	15	6/6	–1/–	4 12 4
British Thermostat (5/–)	18½	18½	23/9	–⅛	3 18 0
BritishVac.Cleaner (5/–)	30	20	25/–	–½	4 0 0
Brush Ord.(5/–)..	9	10	10/6	–1/–	4 15 3
Burco (5/–) ..	15	20	23/9	–⅛	4 4 7
ChlorideEl.Storage	15	15	98/9	–⅛	3 1 0
Christy Bros. ..	12½	17½	85/–	..	4 2 7
Cole, E. K. (5/–)	20	20	33/9	–⅛	2 19 2
Cossor, A. C. (5/–)	10*	12½*	34/6	–3/–	1 16 9
Crabtree (10/–) ..	17½	17½	52/–	–6d.	3 7 4
CromptonParkinson Ord. (5/–) ..	22½	22½	34/–	–6d.	3 6 3
De La Rue ..	40	40	12½	–½	3 5 4
Decca (1/–) ..	100	112	58/9	+½	1 18 6
E.M.I. (10/–) ..	8	8	32/9	–1/6	2 8 9
Elec. Construction	10	12½	67/6	..	3 14 0
Enfield Cable Ord.	12½	12½	60/6	+1/–	4 2 8
English Electric	10	10	63/6	+1/–	3 3 3
Ericsson Tel. (5/–)	22*	20*	56/–	–1/6	1 15 6
Ever Ready (5/–)	40	40	47/6	–2/6	4 4 2
Falk Stadelmann	7½	10	48/9	–⅛	4 2 0
Ferranti Pref. ..	7	7	34/6	..	4 1 2
G.E.C. : Pref.	6½	6½	37/6	+1/–	3 9 4
Ord.	17½	17½	5⅛	–⅛	3 9 3
GeneralCable(5/–)	15	15	23/–	..	3 5 2
Greenwood&Batley	15	15	52/–	+2/–	5 15 5
H.T.A. (10/–) ..	12½	10	21/6	–6d.	4 13 0
Heatrae (3/–) ..	12½	12½	8/–	+6d.	4 14 0
Henley's (5/–) ..	20	20	28/–	–6d.	3 11 5
4½% Pref. ..	4½	4½	25/–	..	3 12 0
Hopkinsons ..	17½	20	5½	–½	3 18 2
Intl. Combustion	30	32½	9½	–⅛	3 8 6
Johnson & Phillips	15	15	85/–	..	3 10 7
LancashireDynamo	22½	22½	5⅓	–⅛	3 18 2
Laurence,Scott(5/–)	12½	12½	14/6	..	4 6 2
LondonElec.Wire	7½	7½	43/9	..	3 8 9
Mather & Platt ..	10	10	56/3	–⅛	3 11 2
Metal Industries(B)	9	10	61/3	+⅛	2 18 6
Mid. Elec. Mfg. ..	25	25	8⅞	+⅛	2 16 1
Murex	20	20	90/–	–⅛	4 9 0
Newman Ind.(2/–)	22½	22½	9/–	–6d.	4 5 6
Plessey (5/–) ..	20	20	38/9	..	—
Power Securities	6	6	31/–	+1/–	3 17 5
Pye Deferred (5/–)	25	25	37/–	–4/3	3 7 8
Radio & Tel. (2/–)	25	15	10/–	–1/6	3 0 0
Revo (10/–) ..	17½	20	54/6	–1/–	3 13 3
Reyrolle	12½	12½	80/–	–½	3 2 6
Scophony (5/–) ..	—	—	10/6	–6d.	—
Siemens Ord. ..	7½	7½	37/–	..	4 1 1
Strand Elec. (5/–)	10	12½	13/–	–3d.	4 16 4
Switchgear&Cowans (5/–) ..	20	20	27/–	..	3 14 0
T.C.C. (10/–) ..	10	12½	31/9	+6d.	3 18 8

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Aug. 23	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing *(Continued)*					£ s. d.
T.C. & M. ..	10	10	58/3	−1/3	3 8 9
TelephoneMfg.(5/−)	9	9	14/6	..	3 2 1
Thorn Elec. (5/−)	20	20	31/3	−7/−	3 4 0
Tube Investments	20	22½	6⅞	..	3 12 10
Vactric (5/−) ..	22½	Nil	18/9	−3d.	—
Veritys (5/−) ..	7½	7½	9/−	..	4 3 4
WalsallConduits(4/−)	55	55	55/6	−4/−	3 19 4
Ward & Goldstone (5/−)	25	35	49/6	+1/6	3 11 0
Watford (2/−) ..	15	15	8/−	−3d.	3 15 0
WestinghouseBrake	14	14	78/−	−1/−	3 11 9
West, Allen (5/−)	7½	7½	8/−	−1/6	4 13 9
Traction and Transport					
Brit. Elec. Traction :					
Def. Ord. ..	45	45	1125	−20	4 0 0
Pref. Ord. ..	8	8	178	−4	4 10 0
Calcutta Trams..	6½	7½	70/−	−5/−	2 3 0
Cape Elec. Trams	5	6	32/−	+6d.	3 15 0
Southern Rly. :					
5% Prefd. ..	5	5	70½	−1	7 1 10
5% Pref. ..	5	5	111	−4	4 10 2
T. Tilling ..	10	10	54/−	+6d.	3 14 0
West Riding ..	10	10	43/9	..	4 11 4
Telegraph and Telephone					
Anglo-Am. Tel. :					
Pref.	6	6	136½	+3	4 8 0
Def.	1½	1½	32½	−1	4 13 9
Anglo-Portuguese	8	8	32/−	+6d.	5 0 0
Cable & Wireless :					
5½Pref. ..	5½	5½	117	+2½	4 14 0
Ord.	4	4	113	+½	3 10 10
CanadianMarconi$1	Nil	4 cts.	15/−	−⅛	—
Globe Tel. & Tel :					
Ord.	8½*	5*	42/6	−3/6	2 7 0
Pref.	6	6	32/6	−1/−	3 13 10
GreatNorthernTel. (£10)	20	18	32	..	5 12 6
Inter. Tel. & Tel.	Nil	Nil	27½	−1½	—
Marconi-Marine..	7½	7½	36/−	−2/3	4 3 4
Oriental Tel. Ord.	4	4	58/9	−2/9	—
Telephone Props.	Nil	6	22/6	+1/−	5 6 7
Tele. Rentals (5/−)	10	10	14/6	..	3 9 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from p.* 353)

the price on the month by 7s. 6d. to 61s. 3d. The dividend has been cut from 15 per cent to 10 per cent. This came unexpectedly, and the trading loss on the year, shown by the figures, caused disappointment. Thorn Electric and Associated British Engineering are ex rights, the falls in prices being apparent rather than real. Veritys, Ltd., again announce that there is to be no addition to the interim dividend already paid. This is the third successive year in which this practice has been adopted. Previous reports have referred to delay in connection with the settling-up of Admiralty contracts.

Postscript Prices

Since this month's price lists were made up, Metal Industries " B," on the increased dividend, have risen to 62s. 6d. De la Rue at 12½ are 10s. lower on the month. British Vacuum put on 2s. 6d. to 27s. 6d. A. C. Cossor rallied to 35s. 6d. Decca Records rose to 61s. 3d. The Indian group is weak, with Calcutta Trams down to 67s. 6d. and Madras Electrics to 40s. 6d.

Fortnightly Accounts

By a decision of the Stock Exchange Council, the pre-war system of fortnightly settlements will be restored, within a few months, in place of the present rule by which all transactions are done for cash. The decision is welcomed by Stock Exchange firms, whose staff work will be simplified, and by the investing public, who should see a marked reduction in the delays which at present occur before transfers and stock certificates in respect of purchases are received. Pre-war aids to speculation in the shape of contangoes, options and forward dealings are not to be re-introduced at the present time.

TRADE MARKS

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within one month from August 21st :—

MICROMAC. No. 640,281, Class 9, and Micromatic. No. 640,282, Class 9. Electric switches and electric plug and socket connectors.—C. H. Parsons, Ltd., Britannia Works, Wharfdale Road, Tyseley, Birmingham. (To be associated with Nos. 640,282 (3569) and 640,281 (3569) ix, respectively.)

LEWVAN. No. 640,539, Class 9. Insulated wire, fuse wire and resistance wire, all for electrical purposes.—London Electric Wire Co. & Smiths, Ltd., 24, Queen Anne's Gate, S.W.1. (To be associated with No. 615,388 (3312) ix and others.)

SPENSTEAD. No. 640,877, Class 9. Electric dust-removal apparatus.—Spencer & Halstead, Ltd., Bridge Works, Wakefield Road, Ossett, Yorks. (To be associated with No. 496,231 (2654) and others.)

DECOLA (design). No. 641,330, Class 9. Radio apparatus, radio-gramophones, gramophones and records.—Decca Record Co., Ltd., 1 and 3, Brixton Road, S.W.9. (To be associated with No. 359,891 (1887) viii and others.)

BURNEAT. No. 637,477, Class 11, and FAYNEAT. No. 637,479, Class 9. Gas and electric cooking apparatus and water heaters.—Neat Gas Appliances, Ltd., 31-35, Belle Vue Road, Hendon, N.W.4.

CLECO. No. 639,659, Class 12. Motor land vehicles, trucks, caravans and trailers.—Cleco Electric Industries, Ltd., 7, Freeschool Lane, Leicester.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

J. L. BAIRD.—" Screens for television." 7978. April 28th, 1944. (579482.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Magnetic core structures." 7040. April 17th, 1944. (579467.) " Impedance matching transformers." 17855. October 28th, 1943. (579665.)

British Thomson-Houston Co., Ltd., and F. J. Clark.—" Electric drum controllers." 10558. June 1st, 1944. (579603.)

Brookhirst Switchgear, Ltd., and J. T. Golothan.—" Electric switches and switchgear." 10716. June 3rd, 1944. (579608.)

R. P. S. Buckle.—" Combined electric tumbler switches and plug couplings." 8105. May 1st, 1944. (579488.)

Callender's Cable & Construction Co., Ltd., and E. Tunnicliff.—" Manufacture of insulated electric wires and cables." 17582. October 25th, 1943. (579662.)

Callender-Suchy Developments, Ltd., and C. T. Suchy.—" Filters." 4675. March 13th, 1944. (579571.)

Carlisle Electrical Manufacturing Co., Ltd., and H. V. Carlisle.—" Electrical service distribution arrangement." 2808. February 15th, 1944. (579569.)

C. J. Carter and Pye, Ltd.—" Arrangement for monitoring pulse modulation." 18031. December 18th, 1942. (579652.)

E. K. Cole, Ltd., and J. N. I. Evans.—" Production of an electrically conducting layer on the envelope of an electron discharge device or the like." 9635. May 19th, 1944. (579531.) " Manufacture of fluorescent material for fluorescent lamps." 9779. May 20th, 1944. (579534.)

Cosmocord, Ltd., and A. Schumann.—" Electrical devices employing piezo-electric crystals." 9356. May 16th, 1944. (579524.)

A. C. Cossor, Ltd., and D. A. Bell.—" Demodulating apparatus for pulse signalling systems." 15305. September 17th, 1943. (579565.)

A. C. Cossor, Ltd., and P. T. Hodgson.—" Electric discharge devices." 4500. March 19th, 1943. (579653.)

J. A. Crabtree & Co., Ltd., B. G. Harrison and W. E. Hill.—" Sockets of electric couplings." 10287. May 26th, 1944. (579546.)

N. Dixon, R. S. Robinson and W. T. Glover & Co., Ltd.—" Manufacture of insulated electric cables and wires." 17583. October 25th, 1943. (579663.)

English Electric Co., Ltd., and E. A. Binney.—" Dynamo electric machines." Cognate applications 3479/44 and 1038/45. February 24th, 1944. (579570.)

General Electric Co., Ltd., and A. Abbott.—"Protective arrangements for alternating-current systems." 9141. May 12th, 1944. (579520.)

General Electric Co., Ltd., and W. M. Michaelis.—" Apparatus for generating repeated electric pulses." 21943. December 31st, 1943. (579679.)

Hazeltine Corporation.—" Television signal-generating system." 5846/44. March 30th, 1943. (579600.)

Hoover, Ltd.—" Suction cleaners." 10533/44. May 12th, 1943. (579558.)

Igranic Electric Co., Ltd.—" Electric snap action switches of the multiple circuit controlling type." 10058/44. May 26th, 1943. (579542.)

W. H. H. Kelk and D. O. Burns.—" Electromagnetically operated timing mechanisms." 17047. October 18th, 1943. (579659.)

Marconi's Wireless Telegraph Co., Ltd.—" Diversity radio-receiving system." 8704/44. May 6th, 1943. (579507.)

Marconi's Wireless Telegraph Co., Ltd., and H. R. Cantelo.—" Frequency controlling and stabilizing means in radio apparatus and the like." 16450. October 7th, 1943. (579567.)

Marconi's Wireless Telegraph Co., Ltd., and H. J. Round.—" Magnetostrictive devices." 12533. September 26th, 1941. (579645.) " Devices for the transmission and reception of energy of the nature of sound energy." 12609. September 29th, 1941. (579646.)

B. J. Mayo and H. E. Holman.—" Electron discharge devices employing hollow resonators." 2122. February 17th, 1942. (579648.)

M-O Valve Co., Ltd., and J. A. Smyth.—" Electric discharge devices." 8678. June 24th, 1942. (579651.)

National Carbon Co., Inc.—" Electrical contact brushes." 8846/44. June 23rd, 1943. (579509.)

L. C. Olsen.—" Synchronizing devices for telegraphic receivers." 8439. May 4th, 1944. (579499.)

Ripaults, Ltd., and G. A. Roberts.—" Stands for spools of cable and the like." 8371. May 3rd, 1944. (579495.)

J. Robinson.—" Wireless receiving and transmitting systems." 8788. June 1st, 1943. (579655.)

E. C. Rollason and Murex Welding Processes, Ltd.—" Manufacture of non-ferrous welding rods or electrodes." 11951. June 23rd, 1944. (579635.)

Standard Telephones & Cables, Ltd.—" High frequency amplifiers." 9880/44. January 30th, 1943. (579536.) " Demodulating arrangements for frequency modulated electric waves." 18911/43. November 13th, 1942. (579671.) " Means for pulse radio frequency oscillators." 19414/43. November 23rd, 1942. (579673.) " Electric signal communications system." 20746/43. September 19th, 1942. (579677.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Moulded worm shaft." 10443. May 31st, 1944. (579577.)

Standard Telephones & Cables, Ltd., and R. H. Dunn.—" Generation of impulses." 8426. May 4th, 1944. (579498.)

Standard Telephones & Cables, Ltd., and B. Secker.—" Electric measuring apparatus." 9595. May 18th, 1944. (579530.)